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EDITORIAL NOTES—GAS, &c.

Gas and Coal Prices at the South Metropolitan Company's Meeting.

WHATEVER may have been the reason—whether it was singly or combined the questions of the price of coal, the prospective small reduction of dividend owing to the increased price of gas, or the placing of the Workmen Directors in greater security in regard to their tenure of office, did not transpire—the gathering of the proprietors of the South Metropolitan Gas Company at the Cannon Street Hotel last Wednesday was numerically quite out of the ordinary for an August meeting; but there were many among the proprietors who went away grievously disappointed. The cause is one for which there is no doubt a remedy; and we feel sure that Sir George Livesey and his colleagues will be only too pleased to have the matter brought to their attention, so that the remedy may be sought and applied. The acoustic properties of the Great Hall at Cannon Street Hotel have never been of the most satisfactory; and latterly there appears to have been an increase of external noises which diminish within the travelling power of the voice and curtail the range of the ear. Sir George had to request the repetition of a question at the close of his speech; and we can assure him that his difficulty from his central vantage ground was nothing compared to that of his great audience, not only on the fringe of the gathering, but several rows of seats nearer the Directors' table. The continuance of this will not do. The South Metropolitan Gas Company are the most democratic in the country; their meetings the best attended and most popular; and proprietors in such large numbers are not drawn to them merely for the satisfaction of hearing a few stray words. They ought not to be disappointed.

Having discharged what we conceive to be a little duty, there are two or three of the general subjects that were before the meeting that are open to comment. Brief consideration was given in last week's issue to the somewhat contrary administrative policies which influence the raising or the maintenance of the price of gas when higher manufacturing costs obtain through outside pressure. This was Sir George's leading theme, from which depended other matters, in the thoughtful address he delivered with the zest of one put on the defensive, and possessing the ability to perform his part. The Company have, owing to the largely increased cost of coal, raised the price of their 2s. gas, while other Companies with higher prices have not done so, or have advanced by a smaller amount. And there are people asking for the obvious explanation. Past policy sways present doings; and there are two policies which affect the current question of the relation of coal and gas prices. Both policies have their good points; and it is not Sir George who offers any prim precept which would inferentially deny that the policy that was not that of himself and his colleagues in this respect was the incorrect one, but practice discloses preference. It has been the policy of the South Metropolitan Company, while not neglecting the reserves *pro re natâ*, to, as soon as the undivided surplus admitted, reduce the price of gas, and so give the consumers the benefit of low charges as frequently and for as long as possible. On the other hand, there are managements that, when conditions are propitious, accumulate surpluses, and that consequently, when such adverse circumstances befall as the present, find themselves in a position to prolong the time before an increase in price is inevitable, or, perhaps, to stave off the evil day altogether. As to which is the better policy, it is difficult to speak dogmatically; but the *pros* and *cons* are well worth discussing.

There is a great deal to be said in favour of, according to the circumstances of the time, bed-rock prices for gas. Such prices are undeniably the best for promoting the expansion of custom, of which it is an excellent thing to procure as much as possible when prices are low to assist the position when prices are above the normal. But, on the other hand, the accumulation of a surplus in good times, by not working down to the finest possible charge for gas, does assist in keeping prices more uniform; does help to obviate the difficulties that arise through prepayment consumption having to be altered on changes in price; and is also helpful to the general consumers, inasmuch as, when the price of gas goes up, then, too, is the period when, as a rule, other commodities—such as the competing fuel coal at the present time—are not at their lowest values. Sir George is continually exhorting to providence and preparation for rainy days in the personal aspect of life; but *primâ facie* his speech on this occasion seems to rather violate his principles in their application to this particular feature of Gas Company management. But his reply to this would be that a contented *clientèle* in normal times is a better protection when working conditions are uncompromising than a large floating balance of undivided profit. There is another phase of the matter upon which he remarked in his speech. If, he says, the Company had accumulated large balances, and so had found no necessity to increase the price now, the consumers might reasonably have said: "How these Gas "Companies must have been fleecing us in the past, if they "can go through these extremely adverse periods without in- "creasing the price of gas!" This statement he follows up with one to the effect that consumers in the South Metropolitan district, having had explained to them, through a circular, the cause of the increase in price from 2s. to 2s. 3d. per 1000 cubic feet, have not complained. It may be submitted that the consumers would equally appreciate the very good reason supplied by an accumulated balance (to the production of which they had contributed) as to why an increase in the price could be deferred when market vagaries induced an augmentation in manufacturing costs.

Another point of view (which may be conveniently introduced here) regarding this matter of low prices and undivided balances was taken by Mr. H. E. Jones, at the Wandsworth Gas Company's meeting. Mr. Jones sees in the undivided balances in the hands of Gas Companies something to attract the eyes of mercenary coal proprietors. His ground for suspecting these gentlemen is that, previous to the coal contracts for the present year being negotiated, a Sheffield paper (as was announced in the "JOURNAL" six months ago) spoke of an arrangement having been effected between the coal-owners of four counties, "with a view to so lifting contract "prices for gas coals, that a portion of the large profits now "being earned by Gas Companies in all parts of the country "should be transferred to the colliery owners' pockets." But coalowners apparently have little regard for the condition of the exchequers of their customers, nor for the fact that in many Gas Companies the proprietors have not been dividing profits up to the limits defined by the operation of the sliding-scale, for the coalowners have dealt their heavy blow on this occasion with a fairly impartial hand. However, on the general question of the policy of the lowest price as against goodly accumulations of undivided balances, with us—although the case from the opposite side has been put somewhat strongly—the preference inclines to the sound principle of supplying at the lowest reasonable price, to the promotion of the current and lasting interests of the business, and because (providing adequate attention has been given to the funds for special emergencies) inflated undivided balances are opposed to the very essence of the sliding-scale.

It is impossible now to refer to the coal question, at meetings of companies engaged in industrial pursuits or in public service—no matter the political colour of speakers or hearers—without denouncing the abolition of the coal tax as a false step, the taking of which was prompted by the spurious sentiment and righteousness so freely scattered by the coal owners and miners. The speciousness has been found out, and having been found out is being condemned with might and main by those who are the victims of the error of judgment on the part of the Chancellor of the Exchequer. This is not a party question; it is a national one. And most

Chairmen of Gas Companies have so recognized it during the present half-yearly meetings. Sir George returned to the charge at the meeting of the South Metropolitan proprietors; and he did not leave it until he had made a point at the expense of Mr. Asquith, which exposes the ludicrousness of a claim by the right honourable gentleman, which claim he may possibly wish some day, if he has not done so already, had been numbered among (as Mr. "Punch" would put it) those things he would rather have left unsaid. Mr. Asquith, asked in the House of Commons what he had done to reduce taxation in this country, hoisted high the abrogation of the duty on exported coal. This is really ineffably funny. To cut off revenue coming from an outside source is a singular way of reducing taxation within the country; a plan engrained with a great deal more sense would have been to have doubled the tax, and thus increased the revenue. Not only has there been loss of revenue to the country, but the captains of industry on all hands, with the exception of a few whose party spirit rise superior to a question of national economics, have condemned the removal of the coal duty as having aggravated a condition of things that has produced an increased cost upon the people of the country, and upon its industries, and that bids fair to disorganize transport to the detriment of home industry and general comfort in the coming winter. Mr. Corbet Woodall is a Director of the Imperial Continental Gas Association and Chairman of the Danish Gas Company; Mr. H. E. Jones is a Director of the European, the Bombay, and the Primitiva Gas Companies—all of whom are operating abroad, to large extent, with British capital. Nevertheless, these gentlemen have not a good word to say for the abolition of the duty. They would much rather—quite apart from their home interests in the gas industry—have continued to pay the duty than have had to face a considerably higher price for coal and, in addition, congested ports. Mr. Asquith may flatter himself for having relieved the foreign buyer at the expense of the British taxpayer and industry; but we have not all reached those altruistic heights at which, for such an action, for such an error of judgment on the part of one sitting in a high and responsible place, we can contentedly and without murmur pay such a penalty as we are now doing. No one is, of course, so unreasonable as to assert that this removal of the export coal duty is the sole cause of the higher prices for coal; trade prosperity is a further cause. But the gas industry furnishes a fairly good index of general trade prosperity; and of late progress in the industry has been, speaking generally, only about at normal level. It was suggested in the speech of Sir George that the country would have been better off with a 2s. export duty than it is now through its withdrawal. Mr. Fell called the attention of the House of Commons to this suggestion last night by a question to the Chancellor of the Exchequer; but Mr. Asquith said he was not prepared to consider the re-imposition of a duty.

There were several other matters discussed by Sir George at the meeting—both general and domestic; the former including the serious one of the assessment of gas-works property, and the latter the system of Workmen Directors. A periodical limit has to be named before the lapse of the preceding period for the continuance of the operation of the Workmen Director scheme; and so well do the South Metropolitan Gas Company, like the South Suburban Company, regard their experience of Workmen Directors, that a further period has now been fixed extending to 1950, subject to certain controlling conditions. The South Metropolitan Company are to be complimented on the grand object-lesson they have supplied to industry in the co-ordinating of the interests of capital and labour, with such effect that all such agencies as conciliation and arbitration for the composing of labour difficulties are consigned to the category of mere superfluities.

Commercial Gas Company Affairs—Prepayment Gas-Meter Robberies.

THE proprietors of the Commercial Gas Company, through the positive evidence of the half-yearly accounts, aided by the breezy confidence of their Chairman (Mr. W. G. Bradshaw), were able to leave their meeting last Thursday with hopes undamped. The financial affairs of the Company were noticed last week; but the Chairman threw some light on the policy of the Board in connection with the coal situation. The price of gas has been raised by 1d. to 2s. 6d. per 1000 cubic feet; but the Company is one of those with a comfortable balance of undivided cash. The fluctuations of the markets for materials in the course of the past twenty years have caused the Board to adopt a preparatory policy with regard to them, and to accumulate a substantial sum so as to keep down the price of gas and maintain the dividend. The attitude of the Board in relation to the coal market has been to confine purchases to Durham, owing, the Chairman informs us, to the greater make of gas per ton, and to the anticipated congestion of the ports in communication with the Yorkshire coal-fields. The Chairman had a word of congratulation for the Board and the executive officers of the Gaslight and Coke Company upon the improved position and prospects of the premier undertaking. The "Coalite" people will take note that, if there is a profitable demand for a smokeless fuel of a character and quality different from that already distributed by the London Gas Companies, that all three are prepared to do their part in meeting the demand. The Gaslight and Coke Company have already taken action with "Carbo;" Sir George Livesey spoke his mind on the subject at the Engineering Conference; and now the Chairman of the Commercial Gas Company has made an announcement which means that they will not unwilling to oblige the people of their district, if the demand arises—all of which indicates that the Coalite Company, with their hyperbolical views and pretensions, are not going to occupy any position in the fuel market unchallenged by those in prior possession of it.

Another matter raised at the meeting was the question of the pilfering of prepayment meter cash-boxes. In February last, the Chairman stated that the robberies in the Company's district were not very numerous; but it now seems they are sufficiently so to attract the attention of local proprietors in the Company, and to come before the Board for special discussion. Mr. Bradshaw acknowledges the difficulty of the question, and puts his finger on the weak spot of the prepayment equipment when he describes the coin meter as a "flimsy thing." But he does not know what can be done without going to great expense, though from the point of view of morality, he would be very glad if a remedy could be applied. To ease his conscience in this matter, the way seems clear. The flimsiness of the coin meter is the acknowledged tempting fault; therefore the coin-box of the prepayment meter requires strengthening. It follows that what Mr. Bradshaw has to do is to suggest to his colleagues that only prepayment meters with specially strong boxes should in future be fixed; that as existing meters are taken out for repair, the stronger money-box should displace the weaker one; and that in those localities specially affected by depredators, the meters should be changed for those with thief-resisting cash-boxes. The process of extirpating the flimsily constructed money-boxes would be a gradual one, and thus would not occasion any great lump additional expense. A little enlightenment may perhaps be obtained from the articles on the subject in the "JOURNAL" for Feb. 5, p. 333, and April 9, p. 90.

Gas-Works Rating—Suggested Action.

"COMING events" are said "to cast their shadows before "them." Does the reference to the subject of rating by Sir George Livesey, at the South Metropolitan meeting, foreshadow an active attempt to establish the rating of gas-works on a more rational system than the present? No system of rating can be regarded as satisfactory which has nothing better at its roots than a hypothesis which can be squeezed, stretched, and distorted according to individual fancy, and which yields, through lawyers and experts, a confusing mass of figures from which an incompetent Court is expected to extract justice. Sir George was not sparing in his condemnation of the system; and the day before Mr. H. E. Jones was equally incisive over its shortcomings, at the meeting of the Wandsworth Gas Company. It never was without its faults, even when the subjects to be assessed were not so variable in character and purpose as now; but what has been tolerated in the past will not fit the present. There has been some spasmodic and independent effort at obtaining a fairer system by certain Gas Companies, and chiefly by the South Metropolitan Company, whose action both at Quarter Sessions and in the High Court has unfortunately so far proved abortive. For this, apparently, Sir George does not blame the Court of Quarter Sessions so much as the system; he probably takes the generous view that the Court as constituted did not understand the question, and in its wisdom declined to commit itself further than by the unsatis-

factory method of saying the "appeal is dismissed." What is wanted is a rational system of assessment, and the placing of the rating of such complicated undertakings as those engaged in gas supply in the hands of impartial and qualified men. How is this to be accomplished? The question is too big for any off-hand answer. But what should be the first step in the matter, is suggested by Sir George Livesey. "I think," he says, "the Gas Companies would do well to "take action themselves (it might be started in London in "the first instance), to promote a Bill in Parliament for the "rating of Gas Companies on a fair, clear, and under-"standable basis. Of course, such a Bill might not be "passed; but at all events it would open the subject, and "show the necessity of something of this sort being done." It seems evident from this that we shall not have to wait until the next quinquennial reassessments before we hear more of the rating question.

It is a pity the consumers of such things as gas and water cannot bring their weight to bear upon the matter. The conditions in London are so complex that it is the most difficult thing imaginable to get ratepayers or a class of consumers to act in a body; and of all questions, they do not generally appreciate how this one of assessment affects them. Gas and water undertakings, as Mr. Charles Hunt pointed out in his Presidential Address to the Institution of Gas Engineers in June, pay away a much heavier percentage of their receipts in the shape of rates than any other trading business [see "JOURNAL," June 25, p. 991]; and it would not be amiss if consumers raised their voices in common protest against the cost of these two necessaries of daily life being unduly burdened in this way. The figures quoted by Mr. Hunt were furnished by the South Metropolitan Gas Company; and they showed the actual gross receipts of various trades in South London, together with the amounts paid in rates, and the percentages of rates paid on the gross receipts. The average paid by the trades quoted in the table was 0·925 per cent. of the gross receipts; and by the South Metropolitan Gas Company no less than 6·6 per cent. of the receipts from gas. Cheap as gas is in South London, consumers will see from this that they not only contribute heavily to the local expenditure through their own direct rates, but indirectly through the gas they use, while consumers of paraffin oil and the dearer electricity get off much lighter in indirect taxation. What is wanted is a revision of the rating system; and what is now suggested is that gas undertakings should by persistent action insist upon being heard, and having not special favour, but justice meted out to them.

The Irish Association Meeting.

NOTWITHSTANDING that, as the President said, the annual meeting of the Irish Association of Gas Managers was overshadowed by the holding of the meeting of the Institution of Gas Engineers in the same city two months ago, the gathering of Irish members in Dublin last week gave no indication that the smaller body had, in any way, suffered from the visit of the larger. The attendance, and the quality of the programme provided, fully justified the Association in holding their annual meeting at the usual time of the year.

The premier position in the programme must be given to the address of the President, Mr. T. J. Reid, of Ballina. It was somewhat long; but it was couched in vigorous and characteristic language, and contained numerous pointed criticisms of existing methods of working and sage advice as to improvement. It would almost seem as if Mr. Reid's isolated location has specially fitted him for cultivating the faculty, as he puts it, of getting outside his work. His very sensible advice to others he puts in practice himself; his remarks bearing as much the character of one who views from over the way, as of one who ponders from within. Particularly interesting was the portion of his address dealing with the financial policy to be followed by the administrators of gas-works of limited magnitude. The President is all for caution, and rightly so, in the adoption of new schemes in connection with small works. It would also appear that he is desirous of reconstructing capital accounts, so as to simplify the financial side of gas undertakings. In small undertakings, and particularly so in diminishing towns, the capital account is the greatest source of weakness. In a concern which is progressive, the capital account may be kept open, and little or no drawback be felt; but when the tide is on the ebb, how to keep the body afloat is a question of great anxiety—there being, in the constitutions of companies, no provision made for the extinction of capital equivalent to that statutorily imposed on public bodies. Mr. Reid longs for the advent of a modern financier, who would imbue the companies with new life; and he looks for some relief to the tightness of the money market, by getting Irish people to invest in Irish gas companies. The question of finance is one that is always worth serious consideration; and Mr. Reid's leanings, it may be freely conceded, are in the right direction. His remarks as to the selling price of gas may not be fully appreciated by many; but they will bear consideration, especially by managers of small works in Ireland.

An old subject in a new dress was brought before the meeting in a paper by Mr. R. F. Byron, of Nenagh. He pleaded for equality in the conditions of supply between the prepayment and the ordinary consumer; and he asks for this because he finds that the prepayment system as customarily applied presses hardly on the best of the prepayment consumers. The prepayment system had not long run its course before this was perceived; and we remember a discussion by gas managers on the subject in those early days was conducted with closed doors, in the fear that some mischief might be done the system by the leakage of the intelligence to the public. But too much sentiment must not enter into this question of equality as between the prepayment consumer and the ordinary one; for in obtaining a superficial equality (which Mr. Byron will not achieve until he is in a position to drop the ordinary meter-rents), there is the danger of inflicting an injustice on the better-class, or ordinary, customers. Of course, it must be remembered that Mr. Byron supplies in a small town in which the price of gas is 6s. 8d. per 1000 cubic feet; and the prepayment consumer there would be a sort of *rara avis* if on that price an excess of 10d. or 1s. had to be charged for meter and fittings. Mr. Byron does not charge meter-rents for prepayment meters, and he leaves the consumers to provide their own fittings; but he (for the time being) is charging meter-rents to the ordinary consumers. Even when he drops this rent, the higher capital cost of the prepayment meter, the lower average consumption of the prepayment class of consumer compared with the ordinary, and the increased costs attaching to collection, and so forth, would still keep in existence an inequality to the detriment of the ordinary consumer. The fact that one class of consumer pays cash in advance, and the other class takes credit, would not wipe out this inequality. There is only one way of obtaining an approximate equality, and that is by levying a specific rent for the different types and sizes of meters, and for the fittings and appliances supplied, and charging the same price for the gas consumed. This all calls to mind the articles and controversy in the "JOURNAL" a few years ago on "Stops—not Slots," in which it was shown that, under the rentals of the "stop" meter system, the good prepayment consumer is not taxed for being such through the accumulation of the ninepences or tenpences per 1000 cubic feet as his consumption expands; but he pays in the way of rent for the accommodation afforded him a precisely similar amount to his neighbour with the same accommodation, but who consumes perhaps only a tithe of the quantity of gas. We do not think that in a town so large that the personal influence of the manager could not be brought to bear, Mr. Byron's plan would do much for the development of the prepayment meter system. It just stops short at the point where the poor householder finds the prepayment gas system as ordinarily applied exactly fits his circumstances.

The contribution of Mr. W. H. Roberts, of Newtownards, it is to be feared, will not afford much guidance to the managers of small gas-works as to whether or not it is advisable to instal a water-gas plant for emergencies. His view is that such a plant in a small works would not pay save for emergencies, and in a case where it would defer for a time heavy capital expenditure on some other plant. For emergency purposes only, the cost of the gas per 1000 cubic feet would be greater than where it was regularly produced; and the use of the gas for emergency purposes only would also be somewhat of a nuisance to the consumers where the total quantity of gas distributed was of limited amount. A far more interesting part of the paper is Mr. Roberts's brief account of what he has done to reduce the price of his gas from 3s. to 2s. for trade purposes; and upon this point he can speak with greater assurance and authority. We venture to say that he would be prepared to tell us that the day business he has obtained by keeping out suction gas plant, and displacing steam and other means of motive power, by the aid of 2s. gas has been far more beneficial to the

consumers of comparatively small quantities of gas for lighting and other purposes at 3s. per 1000 cubic feet, than would have been the loss of those trade consumers. That is a point which has frequently been made in the columns of the "JOURNAL."

The Audit of Municipal Accounts.

In spite of the continual outcry respecting the block of parliamentary business, it is to be hoped that time will shortly be found for dealing with the vexed question of the auditing of municipal accounts. No one thoroughly acquainted with the subject can pretend that the present system is satisfactory. In theory, it is quite right and proper that the auditors should be elected by the ratepayers, whose interests they are supposed to safeguard; but in practice this advantage is not found to confer much benefit upon anyone. As no qualification is specified for the office, persons without experience in auditing may be elected, as they often are; while in the absence of directions as to the duties to be performed, the extent of the audit is left entirely to the discretion of the persons filling the office. The Joint Committee of the two Houses of Parliament on municipal trading rightly came to the conclusion that this system fails to supply an effective audit. It admitted that in some cases Elective Auditors are able to lay a finger on a particular irregularity, but thought that such discoveries might equally be made by any active ratepayer, whether an Elective Auditor or not. Nor had the Committee anything more favourable to say for the alternative method of audit by the District Auditors of the Local Government Board. These gentlemen have, it is true, the power of surcharge; and, where they exercise their functions, they no doubt do put some amount of restraint upon certain kinds of unauthorized expenditure. But, as is frequently urged by municipal corporations, they are not, as a rule, accountants; and in the opinion of the Joint Committee they are not properly qualified to discharge the duties which are required in the examination of municipal accounts in these days. A better system than either that which exists or that which is offered as an alternative is clearly required. The Taunton Town Council, like many other municipal bodies, have been urged by some of the members who are dissatisfied with the present audit to adopt the Local Government Board system; and they have declined because it offers only a change from what the Town Clerk described as one defective system to another. At a meeting of the Council last week, several members strongly animadverted upon the defects of the present system and the want of effective control of the accounts; but there was no getting over the fact that the only other method available is little, if any, better, and that it would need a Special Act of Parliament to apply it. Under these circumstances, the majority of the Council decided to do nothing, pending the expected action of Parliament in the matter. Mr. John Burns is credited with the intention to carry out reforms in many of the departments covered by the multifarious activities of the Local Government Board; and he might make a worse beginning than by instituting a perfect system of audit in connection with municipal accounts. Only by this means will municipal trading be ever able to justify itself.

Entertainment and Presentation to Mr. R. Bruce Anderson.—On the 12th inst., the managers in Ireland connected with Mr. R. Bruce Anderson, of Westminster, in conjunction with the Westminster office staff, entertained Mr. Anderson at a complimentary dinner at the Palace Restaurant, in the Exhibition Grounds, Dublin, during which an illuminated address was presented to him by the managers associated with him prior to the foundation of the firm of Anderson Brothers. At the same function, opportunity was taken by the whole of the managers connected with the firm to present Mrs. Bruce and Mrs. G. W. Anderson each with an afternoon set of Belleek china.

Business Firms and Christmas Boxes.—A firm of cigar and wine shippers recently wrote to the Attorney-General, with a view of ascertaining the position of firms in reference to Christmas presents. They wrote: "We have been in the habit for many years past of giving Christmas presents of boxes of cigars to our customers or to their representatives. We shall be much obliged if you will advise us whether the giving of such presents is prohibited by the new Act." The Attorney-General replied saying that he cannot be taken as expressing an opinion, but "it is clear that Christmas presents which really have that character, and are openly and honestly given as such, cannot be within the Act."

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 528.)

THE Stock Exchange last week had a rather kaleidoscopic time of quick changes, which made it interesting, and was anyhow better than a run of unvariegated gloom. Certainly things might conceivably have been worse. The start looked bad enough for anything; for, under the influence of the previous Saturday's doings in Wall Street, the opening on Monday was very ill-omened, and Consols fell to 80⅜—a hitherto unattained depth. But, rapidly recovering before the day was out, they actually left off at ¼ advance. On Tuesday, the better feeling made progress. Although the fortnightly settlement was pending, it was confidently believed to prove a light account and threatening no difficulties. A further rise of $\frac{7}{16}$ was marked in Consols; and Railways looked healthier. Wednesday started hopefully, with a careful eye in the direction of Wall Street. Some little buying was visible; but backers of a rise were soon satisfied, and then things fell flat, so that a good deal of the morning's gain was lost in the afternoon. However, the gilt-edged division were pretty firm. Again, on Thursday, under American influence, dulness prevailed; and this was emphasized by a rise in the Bank rate. Another quick change was witnessed on Friday, when, as the Wall Street horizon looked sunnier, the atmosphere cleared in Capel Court. But the brightness faded away before the day closed, and Consols and Rails relapsed. Saturday continued weak, and movements were almost wholly downwards; but absence of any hammering afforded some relief to the apprehensive. In the Money Market, there was a very good demand for short loans; but an abundant supply preserved rates from much movement. Discount rates, however, hardened steadily all through. On Thursday, the Bank of England rate was raised to 4½ per cent. Business in the Gas Market was very quiet; nothing, except the leading issue being dealt in to any extent. The general tendency was steady notwithstanding. In Gaslight and Coke, the ordinary was fairly active for the season, and prices were steady. Stock changed hands at from 94¾ to 95¼ *cum div.*, and from 92½ to 93½ *ex div.* In the secured issues, the only transaction was one in the preference at 103¼ *ex div.* South Metropolitan was moderately dealt in at from 120½ to 121½ *cum div.*, and 118½ to 119½ *ex div.* The debenture marked 82½ and 81⅝—a fall of 1 in quotation. Nothing was done in Commercials but one bargain in the 3½ per cent. at 103. Little business was marked in the Suburban and Provincial group. Alliance old changed hands at 20, British at 42¼, Tottenham "B" at 102½, and West Ham at 102½. The Continental Companies were very inactive. Imperial was done at figures ranging from 173 to 175; but Union and European were not touched. Tuscan marked 10⅜ and 10⅝. Among the undertakings of the remoter world, Bombay new changed hands at 4$\frac{15}{16}$, Buenos Ayres debenture at 94¼, Monte Video at 11⅛, Primitiva at 6⅞ and 6$\frac{7}{32}$, ditto preference at 5, River Plate at from 12⅞ to 13⅛, ditto debenture at 94¼, and Oriental at 144.

ELECTRIC LIGHTING MEMORANDA.

Coveting the Prepayment Gas Business—The Commercial Weaknesses of the Mis-named "Free-Wiring" System—Its Feeble Support—Influence of Temperature on Incandescent Electric Lamps—Electric Plant Culture—Some Points on Illumination.

ELECTRICIANS are looking around for new sources of business; the new metallic filament lamp, with its consumption reducing power, being the *bête noire* of both their day and night dreams. The best they can do is to look once more over the wall at Naboth's new vineyard, and, seeing how good it is, raise again the question of "free-wiring" and slot meters. Mr. Nisbett reintroduced the matter in the "Electrical Times" lately; and his article was briefly discussed in the "Memoranda" on July 30. The design of his dissertation was to support the free-wiring and slot-meter plan of getting new business; and he gave some very good reasons why it should not be adopted, both from the electricity suppliers' point of view and that of the small electricity consumer. His opinion that in "free-wiring" and slot meters rests the salvation of the electricity industry, is countenanced by another correspondent in our contemporary. This correspondent believes that because there is profit in the prepayment business for gas undertakings, there is no reason why there should not be for electricity undertakings; and he also thinks that the reason there has been such "a number of electric installations which have gone back to gas" is to be found in ill-arranged fitting work, and the consequent waste of current. We have shown time after time that the working man with his limited income must, and will if he is prudent, have the utmost value for the money he spends, and the greater value for him lies with gas and not with electricity. Electricians are not going, as Mr. Nisbett opines they may be able to do, to cajole the working man into believing that five 8-candle incandescent electric lamps (which will not always give him 8 candles apiece) are sufficient to afford him a satisfactory illumination in his dwelling. The working man who is a desirable customer is not altogether devoid of sense. He will tell you flatly that he can do much better elsewhere, and that he can have, in addition to incandescent gas-lights, a cooking-stove always available, without any danger of failure in service, and at a great deal

less expense than anything the electrician can offer. Current-absorbing electric radiators, too, with their melancholy appearance and limited heating capacity, are not for such as he. The absurdity of Mr. Nisbett's proposal has already been exposed, as well as the calculated revenue of £1 11s. 3d. per annum per installation of five 8-candle power lights.

A great gulf exists between gas and electricity in the competition for the patronage of the working man. It is the electrician who has to bridge it; but he will not do it by losing money for his undertaking, or by trying to wheedle the working man into accepting as sufficient for him a rush-light illumination. Mr. G. Basil Barham (in the "Electrician") makes merry over the endeavour to re-energize the inanimate "free-wiring" business. He has seen the system tried and monetarily assisted in many places; he can count dozens of electricians who, having been fascinated by it, have, by experience, discovered its fallacies and unprofitableness. And he asserts, in unequivocal language, that no "free-wiring" scheme has yet been a financial success, and no such system that has been devised can ever become so. Its worst feature is in the superposing of additional cost upon an already costly system of lighting. The expression "free-wiring" is really a misnomer—"it is a maglignant misnomer, which perverts and distorts the imagination of those who fall a victim to its subtleties, until, with the coming of the first quarterly account, it rends the veil from the eyes of both consumer and station engineer, and fills the one with the fear of the Bankruptcy Court, and the other with the fear of assassination." Before the question of the cost to the working-man consumer stands, for the electricity suppliers, the cost of installation. Put what Mr. Barham has to say on this head against what Mr. Nisbett said. Mr. Barham states that the average number of lights installed in small houses of the class reached by "free-wiring" is twelve (not five); and the repayment of the cost of installation (which, with that number of points, would be about £7), at 20 per cent., spread over five years, would absorb 28s. per annum, while the interest and sinking fund on the cost of service mains, meters, &c., would total to another 5s. or 6s.—that is to say, 33s. or 34s. a year will be required from the consumer quite independent of his electricity consumption and lamp renewal bills. And this does not allow anything for maintenance. Mr. Nisbett's five 8-candle light installation is expected to produce a revenue of £1 11s. 3d. per annum at 3½d. per unit, *plus* 1½d. to cover the cost of installation. The £1 11s. 3d., at 5d. per unit, represents only 75 units; and 1½d. × 75 would produce the magnificent sum of 9s. 4½d. a year—always assuming the consumer after his first experience continues to use 75 units. This falls very short of Mr. Barham's estimate for a more reasonable installation than Mr. Nisbett's. If a rental system per lamp is adopted, 1s. per lamp for Mr. Barham's twelve lamps would only yield 12s. towards his 33s. or 34s.; 1s. 6d., 18s.; and rental of nearly 3s. per lamp must be charged the consumer to recoup the annual expenditure on this deceptive "free-wiring." Small wonder that Mr. Barham finds that "free-wiring" installations, instead of acting as passive canvassers for the electricity department, produce very active propagators of the dearness of electricity, and exposers of the delusive statements that induced them to become electricity consumers. At the advent of this system in a town, it is much easier to make installations than to make the branch pay after installation; and this is the reason why Mr. Barham can count dozens of engineers who have dabbled in such schemes, and have eventually renounced them as a drag on, rather than a support to, their undertakings. The prepayment gas system will stand long to smile at the puny attacks made by "free-wiring" and such-like.

Well, this "free-wiring" and fittings business does not gain a good word from anybody, excepting a few sanguine beings who entertain the opinion that anything is good enough for the working man's house in the way of equipment and illumination. From a financial standpoint, consulting engineers of the eminence of Sir Alexander Kennedy do not like the system, the Local Government Board do not like it, and the Lord Chairman of Committees is proposing to regulate the matter by the application of some model clauses between this and next session. The electrical contractors do not support free-wiring by municipalities, save on the one condition that the work is done through them and not the administrative authority.

The "Electrician" has published some notes on researches undertaken by MM. Laporte and Jouast, at the Laboratoire Central d'Electricité, on the influence of the surrounding temperature on the candle power of incandescent electric lamps. [M. Laporte contributed some valuable records of work on the standard flame lamps at the meeting of the International Photometric Committee, *ante*, p. 315.] We do not call to mind any experiments of the kind on incandescent gas-lamps; and these researches may suggest an investigation. In this case, an incandescent lamp, consuming about 4 watts per candle power, was fixed in a stove with a transparent side. A photometer was placed at a certain distance from the stove, and an equal illumination was obtained on its screen by moving the standard lamp. Great precautions were taken to maintain constant the voltage across the lamp terminals; a potentiometer being used for the purpose. In order that the variation of temperature should have no influence on the resistance of the contacts, both the main and the voltmeter wires were soldered direct to the lamp terminals. The candle power of, and the current through, the lamp were measured under the following conditions: (1) With the stove cold, at a temperature of about 15° C. (2) During the heating of the stove. (3) With the stove at a constant temperature of 115° C. (4) During the cooling of the stove. (5) With the stove completely re-cooled at a temperature of about 15° C. The candle-powers measured were found to be practically constant; the greatest variation between the extreme readings not exceeding 1 per cent. The current through the lamp was found to be constant to within 0·05 per cent. of its mean value. These results are interesting to note, as certain experimenters have observed a variation of 0·1 per cent. in the candle power of an incandescent lamp per degree variation of the surrounding temperature.

Mr. B. H. Thwaite is in the field again with what his enthusiastic nature no doubt prompts him to belive will really be a revolutionizing idea in the vegetable kingdom. The application of electricity to plant culture—on an experimental scale—is no new thing; but the game has not been found to be worth the electric light expended. Horticulturists and others interested in the matter have preferred more direct and less expensive means of stimulating growth. But Mr. Thwaite has a plan for economizing, by putting to the fullest use the products of electricity generation under his scheme; and a trial installation has found a place at the Royal Botanic Gardens. It is a system of many parts and purposes, and of suspected virtues—that is to say, "suspected" by its author. The necessary heat and actinic light as well as the carbon dioxide, moisture, and nitrogen fertilizer in the form of sulphate of ammonia, are to be derived from coal. "On the perfection of the combustion of the coal or fuel depends the entire economy of the system;" and this perfection can only be obtained by converting the carbon into a gaseous condition. A suction-gas plant and engine are to be employed, whereby perfect combustion is said to be attained simultaneously with the development of power, which is converted into electrical energy. The heat absorbed by the cooling water in the cylinder jacket is utilized for the purpose of heating the air in the glass-house by means of circulating-pipes; and the heat carried off in the exhaust gases is similarly employed by leading them, after purification by oxide of iron, through earthenware junction pipes into the glass-house, with outlets at suitable points, so that, at the same time, carbon dioxide, water vapour, oxygen, and nitrogen are supplied in a heated condition to the plants. The electrical energy generated is used for feeding arc lights. An electrostatic machine driven from the gas-engine shaft supplies energy which is discharged by points located along the plants; the object being the electrification, not only of the air of the glass-house, but of the plants and their roots as well. The arc lights are equipped with special reflector hoods, confining the beam of light within narrow limits of concentration; the open end of the hood is closed in with a water-screen, to secure as near an imitation of natural solar effect as possible, and to limit the effect of the ultra-red rays. The hood is provided with a chimney to carry off the nitrous oxides that may be produced. The arc lights are constantly and almost imperceptibly moved to and fro along the entire length of the glass-house by an electrical traveller. The particular attention of electricians is called to the fact that Mr. Thwaite is proposing to let the plants have the benefit of the exhaust gases of the gas-engine after purification merely in oxide of iron; but the hoods of the arc lights are to be provided with chimneys for carrying off the nitrous oxides.

In a paper, read a short time since, before the Glasgow section of the Institution of Electrical Engineers, Mr. J. D. Mackenzie devoted himself to the consideration of matters affecting illumination and illuminants. The main purpose of the communication was to sing the praise of lighting by reflection from walls and ceilings. It is a common belief that the indirect method of illumination is most wasteful; but Mr. Mackenzie quotes figures showing that, whereas 50 per cent. of the light given by an illuminant is lost by passing through opal globes, a whitewashed wall or ceiling will reflect light with only a loss of 20 per cent. It will hardly be credited that the carbon filament lamp can afford to lose 20 per cent. of its actual light in this way. Mr. Mackenzie says it is all right; but readers may reserve their own opinions on the subject. Of course, with indirect illumination, there must be double reflection—a direct reflection from reflectors placed behind the illuminants on to the ceiling, and then the diffused reflection from the latter, assisted by similar reflection from the walls and floors, gives the resultant illumination. But the author sticks to his opinion that, in actual practice, it will be found that the difference in efficiency of the two methods is not so great as many may think. Among other points of the paper is one that the eye can bear a greater amount of yellow and orange tinted light than any other; and hence illuminants giving off a preponderance of such rays seem to strain the eye much less than others. The author gives as an instance, the flame-arc light with its yellow and tinted light; and says that, although the intrinsic brilliancy of the lamp is much greater than that of the open arc, the eye can look upon it longer, and with less fatigue, than upon an ordinary arc lamp. This depends on the distance of the flame arc lamp; for however contented the eye may be with yellow and orange tinted light, it finds an agitated light, such as that produced by the composite chemical carbons of the flame arc, is extremely annoying. While Mr. Mackenzie says this good word for the flame arc, he declares that it is unfortunate for our eyesight, and that of the rising generation, that there is the present craze for increased illumination; the effect being seen in a most alarming increase of ophthalmic disease. He quotes as startling a remark of Mr. James Swinburne, that the new high-efficiency lamps will lead to consumers replacing their 16-candle lamps by

others of 25 to 50 candle power; and he urges that electrical engineers should strenuously endeavour to prevent such a calamity. That is not a nice way to talk of the new high-efficiency lamps—another of the hopes of the electricity industry. But it is found a little later on that Mr. Mackenzie advocates the placing of high-efficiency lamps, four in series on 200 to 250 volts, behind deep frieze mouldings, and having the light reflected from the ceilings. Consumers who are anxious to add to their expenses for electric lighting must be few and far between.

THE "CIRCULAR OF INQUIRY" AGAIN.

Following up our remarks from time to time on the attempts made to obtain information in regard to the management of gas undertakings by means of the obnoxious inquiry-circular, we have to call attention to the latest example (given below), which has reached us from more than one quarter. It can only be regarded as a move to get "on the cheap" information which should be procured, at an adequate fee, from a professional gas engineer. Such tactics are reprehensible when they are resorted to by members of small local authorities and others, who possibly wish to "get behind" their gas managers; but when an official of the standing of the American Consul at Liverpool—who it may be supposed is in a position (acting as he is doing on behalf of "a number of public-spirited citizens") to pay for the advice he requires—is found following their example, a stronger word is necessary to characterize the action.

American Consular Service.
Liverpool, Aug. 14, 1907.

Dear Sir,—A number of public-spirited citizens are about to instal a plant in an American city to sell gas at 60 c. (2s. 6d.) per 1000 cubic feet. The general conditions of the situation are briefly summarized in the enclosed statement. In fixing this price of 2s. 6d. per 1000 cubic feet, they are relying in great measure upon the basis established in many English cities. They have asked me to make inquiries to ascertain, if possible, if there are any important factors of difference between their situation and the conditions prevailing in your city which you think would make the success of their undertaking doubtful. In other words, they are desirous of knowing if you regard the price under their conditions as sufficient to reasonably promise a successful enterprise. I understand, of course, that whatever answer you might make would simply be a matter of opinion, and not to be regarded otherwise. As their undertaking is of great public interest, I thought you might be willing to give the subject a little of your valuable time. An expression of your views would be greatly appreciated.

Trusting that, in making this request, I am not imposing too great a burden on you,—I am, very truly yours,

(Signed) John L. Griffiths, Consul.

General Conditions Surrounding Proposed Gas Enterprise.

Interest to pay on investment, £15,000 per annum.
Company starts with 133 miles of mains.
Consumption on these lines, 400 million cubic feet per annum.
Estimate, 50 per cent. in lighting, 40 per cent. in cooking, 10 per cent. in power.
No fixed candle power required by law; but gas must be of 600 B.Th.U.
It is proposed to make 16-candle power gas, though not specified by the law.
Coal delivered at proposed works costs 10s. 5d. per ton, and produces 10,000 cubic feet of gas per ton.
Coke sells at 14s. to 16s. per ton at the works.
Ammonia concentrated liquor to be made; brings 20s. per ton.
Tar brings 7d. per gallon.
Prices to be charged for gas, 60 c. (2s. 6d.) per 1000 cubic feet for all uses.
No charges for meters, but consumer deposits 20s. on receiving a meter. Other appliances owned by consumer.
Cost of labour: Mechanics, carpenters, and gas-fitters, 12s. per day of eight hours; stokers 8s. and labourers 6s. per day of 12 hours.

Vertical Pipe Making.—According to the "Engineer," the vertical pipe-making plant imported by the South Australian Government is now under erection at Glanville. Pipes from 6 inches to 3 feet in diameter will be turned out, and the arrangement is such that the manufacture will form an uninterrupted series of operations from the first handling of the raw material to the final touches required on the finished pipe.

Electrolysis of Pipes.—The subject of the electrolysis of pipes is receiving careful attention from the Metropolitan Water and Sewerage Board of Massachusetts, who state in their last annual report that the districts in which such damage occurs seem to be extending. In general, the injury has not proceeded so far as to require immediate repairs; but the examinations show that the corrosive action is advancing. The pipe-lines crossing Chelsea Creek between Chelsea and East Boston were found to be particularly subject to disturbance; and at one point a hole had been eaten through a pipe. The examinations were carried out over the greater part of the system; records being taken of the conditions for future use in caring for the mains. Efforts are being made to devise means of checking the action of the current.

THE CENTENARY OF GAS LIGHTING.

(*Concluded from p.* 446.)

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This history of gas lighting would be incomplete were reference not made to the great strike at the South Metropolitan Gas-Works in 1888, and the introduction of the co-partnership scheme, and the threat of the gas stokers at this period to plunge London in darkness. The story of that great struggle is fresh in the memory of most men—how the brothers George and Frank Livesey withstood the demands of the strikers, and carried on the business.

In 1889, oil being cheap, an experiment in lighting the City streets with petroleum oil was carried out by the Defries Safety Lamp and Oil Company. The experiment lasted for a year; but nothing practical came of it.

Still, in the eighties, gas was being gradually displaced in the large buildings of the chief cities and towns, when an additional aid came to its rescue in the shape of a meter specially designed to fulfil the requirements of the working classes, and known as the automatic or penny-in-the-slot meter. This, together with the incandescent mantle and the increased popularity of the gas-cooker, saved the situation for the gas industry. Now was coming to pass the wish expressed, nearly a century ago, by Mr. Accum, that the dwellings of the working classes might be lighted by the "new illuminant;" for, strange as it may seem, the gas industry at this time had not succeeded in enlisting among its customers, to any large extent, the small householder, the tenant of two or three rooms, and the large number of inhabitants of blocks and artizans' dwellings. The workman preferred to burn oil and to cook by coal, to having to pay a quarterly gas bill, in addition to paying a deposit and signing an agreement at the offices of the company—which in his case meant very often a long journey, and loss of time and wages, in addition to his having to undergo the humiliating process of practically standing on the mat, with his hat in his hand, outside the inspector's room, for an indefinite period, and then being treated with scant courtesy when once admitted. Thus, with the electric light taking the richer customers, and the cheap oil holding the smaller ones, in 1892 the South Metropolitan Gas Company (who had 78,210 consumers on their books, with an annual increase of 1615 consumers, and 19,569 cooking stoves let on hire), began to turn their attention to new ground. Very few weekly tenants used gas; so that it could be taken as fairly correct to say that gas was practically unknown in the dwellings of the working classes. They would never, in addition to the reasons already given, incur the cost of putting in gas-fittings and pipes. Sir George Livesey, in his statement on slot-meters handed in to the House of Commons' Committee in 1899, said "this difficulty might have been overcome by monthly collections, if the demand had arisen, and the question of fittings could have been dealt with."

It is well to remember that slot-meters were first introduced into the Metropolis in 1888 by the South Metropolitan Company in a small way. But after their introduction, there seemed but little chance of their coming into general use; so that the 1888 experiment was dropped. Later on, in 1892, it became known that the Liverpool Gas Company had taken them up, and made them "go," having fixed some thousands. The meter was introduced to the Manager of the Liverpool Company; and he said, "I will try it." He ordered 500; and the thing "went like wildfire," and in a few months they had orders for 8000. "This fact," to use the words of the Chairman, "induced the South Metropolitan Company to go into the matter in earnest;" and before the end of the year, they had 439 fixed. By the end of 1893, the number was 6166; and during the next year, the total reached the respectable number of 25,516; and in 1898, 80,115. It was then seen that these meters had "come to stay;" and taking into consideration the competition of electric light among the well-to-do and business houses and cheap oil among the poorer classes, "it was sufficient," said Sir George Livesey, "to turn the scale in the annual output, and prevent any decrease in that direction." "We adopted the system of canvassing," said the South Metropolitan Chairman, "giving all our employees the option of doing this; and a certain bonus was given for each consumer they brought to the Company. We made no distinction—some were lamplighters, some index-takers, some gas-fitters, and some labourers. One man increased his annual income £46 by them. We gave them 2s. apiece. In fact, we thought we had nearly saturated the district with them, because when we started we estimated there were about 90,000 houses not burning gas. The increase was nearly 14,000 in 1896; only 9600 in 1897. But we tapped another source. We found there were a great many lodgers; and in 1897 we adopted a system of putting two or three meters in a house, and in 1898, the increase got up to 13,500." The Chairman might have added that a "roll of honour" for canvassers was fixed up at the entrance-gates of the yards giving the men's names, the weekly number of customers brought in, the total number of consumers gained, and the amount of money earned; so that a keen spirit of rivalry was set up among the workmen to go out and fetch would-be consumers in. So popular did the prepayment meters become with the tenement class, that at the end of 1906 there were some hundreds of thousands in use in the Metropolis alone; and as a small cooker and a ring were loaned out with each

meter, it very materially assisted in keeping the works manager and engineer busy. To give an idea of the growth of this business, Bristol might be cited as having in 1902 twenty coin-freed meters; while the number they had out in 1906 was 16,157. The large cookers for ordinary consumers were also becoming much sought after; and builders, in erecting new houses, made provision for fixing them. In 1906, to mention only two instances, the South Metropolitan Company had no less than 267,000 gas cookers and fires of all kinds in use; while the Gaslight and Coke Company issued during the same period 110,000 additional cookers —giving them a net increase for that year of 57,000 on this class of goods. To regulate the price of gas to consumers using prepayment meters, Parliament in 1900 fixed it at 10d. per 1000 cubic feet above the ordinary price, to cover cost of fitting and hire.

It would be incorrect not to mention the great gas inquiry held in 1899 by Parliament, in answer to the agitations all over the Northern Metropolis in favour of cheaper gas. The voluminous evidence is still fresh in the minds of all gas engineers. The inquiry continued during the whole length of the session; and the findings of the Committee, which were against the Gaslight and Coke Company, foreshadowed a reduction in the standard price, a lowering of the candle power, and a restriction of future capital powers when any of the Companies came to Parliament. These effects were made operative upon the South Metropolitan Company in 1900, the Commercial Company in 1902, and the Gaslight and Coke Company in 1903. The illuminating power of the first two Companies was reduced from 16 to 14 candles; and the standard price and the statutory dividend of all the Companies were lowered.

In 1905—the use of high-pressure gas for the heating of incandescent mantles having been satisfactorily tested for about five years in the busiest portions of the City and on the principal bridges spanning the Thames—an extended experiment to several of the most important thoroughfares was carried out; the gas being supplied direct from the high-pressure mains of the Gaslight and Coke Company in some cases, and by compressing plants in others. So successful was the experiment, and so well did the public take to it, that it was decided gas-lamps should remain on the removal of the arc columns from the City, from Paddington, and elsewhere, after their thirteen years' existence—a striking testimony to the efficiency of gas-lamps for lighting the busiest thoroughfares of our great cities. Islington followed later on. Strangely enough, at the very time that the experiment had been deemed by the authorities to be a success as a piece of main road lighting, Sir William Preece, in 1905, true to the opinions he held over twenty years previously, speaking at a meeting of the Carnarvon Harbour Trust, when the proposed installation of the electric light on the promenade was under discussion, strongly urged the Trustees to have the promenade lighted by incandescent gas mantles, which, he said, distributed the light much better than electric lamps. He added that he always recommended public authorities to use them in preference to electricity as an illuminant for public thoroughfares. This well-established fact, and the introduction of the inverted burner for indoor and general domestic lighting as a rival to the incandescent electric lamp, gave a great impetus to the gas industry, and more than helped it to hold its own against its once formidable rival.

Passing to another subject of great importance that took place about this time—viz., the legislation with regard to sulphur compounds (that bogey to the gas manager which had caused so much feeling in the late fifties and sixties), which freed the gas industry from harsh restrictions that barred its advancement—it is of interest to note the effect of such freedom upon the Gaslight and Coke Company, whose works' cost for 1906 had been reduced by some £14,000 in purification. This service rendered to the gas industry by Sir George Livesey (for it was he who initiated the legislation), caused Mr. Charles Hunt, referring to the matter recently, to speak of the author of this legislative enactment in the following strain: "The indomitable pluck, perseverance, and tactical skill with which he fought the fight to a finish . . . But for him, it is impossible to say how much longer the industry would have had to labour under the double disadvantage of compulsory lime purification and high illuminating power. But for him, our progress must have been halting and unsatisfactory. It matters not that the battle fought was that of the London Gas Companies, the victory remains with the gas industry as a whole. A momentous step forward has been accomplished; and the gas manager may henceforth devote his time and energies to more profitable use than watching for fluctuations of a few grains of sulphur compounds, or for rushlight changes of candle power." A worthy tribute to the man who, from the year 1848, has devoted himself to the benefit and advancement of the gas industry of the United Kingdom.

It is only fitting here to pay tribute to Mr. Charles Carpenter, who had produced a burner for testing gas which was to at last displace the "old brass burner" and the Sugg argand, both of which had done duty between them for 70 or 80 years. The burner was fully described by Mr. Carpenter in his paper before the Institution of Gas Engineers in 1906, and might be fittingly termed the bringing to a close of one of the chapters in the modern history of gas lighting, so far as testing and public control are concerned, for under the provisions of the London Gas Act, 1905, the Metropolitan No. 2 burner, which is Mr. Carpenter's invention, was adopted by the Metropolitan Gas Referees, and is becoming the prescribed burner for testing gas at a fixed rate of consumption in the modern Gas Acts of the country.

In conclusion, it is instructive to have an idea of the enormous demand for gas for purposes of lighting, cooking, heating, and power at this period of gas history, given by Mr. Charles Hunt in his recent Presidential Address to the Institution of Gas Engineers. "During 1882," he remarks, "the consumption of gas within the United Kingdom was in round figures 57,876 million cubic feet, and the number of consumers 1,971,971. For the year 1905 (23 years after), the consumption was 161,408 million cubic feet, with 5,064,175 consumers." This shows a remarkable growth from the period of the introduction of the electric light.

The following table gives the increases for 23 years in capital, consumption, consumers, and number of public lamps, with the increases.

—	1882.	1905.	Increase.
Capital invested . .	£50,261,118	£124,184,221	£73,923,103
Consumption . . .	57,876 millions	161,408 millions	103,532 millions
Consumers	1,971,971	5,064,175	3,092,204
Public lamps . . .	361,311	665,791	304,480

A few individual cases of increase set out in the following table are interesting.

Town.	1882. Consumption.	1905. Consumption.	Increase.
Glasgow	1,795 millions	5,821 millions	224 per cent
Birmingham	2,692 ,,	6,463 ,,	140 ,,
Leicester	612 ,,	1,835 ,,	200 ,,
South Metropolitan Company	3,822 ,,	12,143 ,,	217 ,,

The consumption of coal by the gas companies for the United Kingdom stands at 15 million tons, of which the principal London companies take no less than 3 million tons.

These are truly remarkable figures with which to bring to a close the story of the rise, progress, and centenary of the gas industry of the United Kingdom.

The attached table gives the price of gas in London from 1823 to July 1, 1907. Previous to 1823, a considerable portion was sold by "rental."

TABLE *of Prices Charged for London Gas from* 1823 *to July* 1, 1907.

Date.	Price per 1000 Cub. Ft.	Date.	Price per 1000 Cub. Ft.	Date.	Price per 1000 Cub. Ft.
	s. d.		s. d.		s. d.
1823	15 0	1854	4 0	1885	2 8
1824	15 0	1855	4 0	1886	2 6
1825	15 0	1856	4 0	1887	2 5½ aver.
1826	15 0	1857	4 0	1888	2 5
1827	15 0	1858	4 0	1889	2 3
1828	13 6	1859	4 0	1890	2 3
1829	13 6	1860	4 6	1891	2 3¾
1830	13 6	1861	4 6	1892	2 6
1831	12 6	1862	4 6	1893	2 5½ aver.
1832	12 6	1863	4 6	1894	2 4½ ,,
1833	11 3	1864	4 6	1895	2 3½
1834	10 0	1865	4 6	1896	2 3
1835	10 0	1866	4 6	1897	2 3
1836	9 6	1867	4 6	1898	2 3
1837	9 0	1868*	3 3	1899	2 2
1838	9 0	1869	3 3		2 1
1839	9 0	1870	3 2		2 1
1840	9 0	1871	3 1	1900	2 4
1841	9 0	1872	3 0		2 8
1842	9 0	1873	3 0	1901	2 8
1843	8 0	1874	3 0		2 3
1844	7 6	1875	3 0	1902	2 3
1845	7 0	1876	3 6†	1903	2 3
1846	7 0	1877	3 2	1904	2 1
1847	6 6	1878	3 0		2 0
1848	6 0	1879	3 0	1905	2 0
1849	5 6	1880	3 0	1906	2 0
1850	4 0	1881	2 10	Jan. 1, 1907	2 0
1851	4 0	1882	2 10		
1852	4 0	1883	2 10	July 1, 1907	2 3
1853	4 0	1884	2 8		

* From 1868 the South Metropolitan Company's prices are quoted, theirs being the lowest.

† Average for the year, 3s. 0½d.

Notes.—1810. "Gas rental" charged, competition.
1823 to 1848. Agreed areas, "Congreve compact" of 1823.
1848 to 1860. Competition.
1860 to 1868. Districting.
1868 to 1883. Amalgamations.
1883 to 1907. Statutory monopoly.
1894. From this date, meter-rents were waived by the Gaslight and Coke Company, who, however, reimposed them at Midsummer 1907. They equalled ¾d. per 1000 cubic feet.

This history throughout has been but a chronicle of facts, and in no way reflects the opinions of the writer, who, however, takes this opportunity of stating his belief that—given cheap gas supplied at a higher pressure than formerly, of a low illuminating power, and of high calorific value to meet the altered circumstances and the new demand—there is no finality for the purposes and uses for which gas can be employed during the coming century.

PHOTOMETRIC TESTS, BY MR. THOMAS GLOVER, OF INVERTED BURNERS.

THE report in the "JOURNAL" of the 23rd ult. (p. 224), on the proceedings of the International Photometric Committee at Zurich, contained a summary of remarks made by Mr. James W. Helps, of Croydon, on the methods in use in England for measuring the light of incandescent gas-burners. Mr. Helps incidentally quoted some figures, which he said had been communicated to him by another gas engineer, to indicate the importance of angular readings being made in photometric testings of inverted burners. At the time, however, Mr. Helps was (our correspondent understood) uncertain as to whether he had his informant's authority to make them known in their entirety or to name their source; and, therefore, he only quoted a few figures from the communication in support of his general observations. The figures were given in the "JOURNAL" report. Mr. Helps has since, however, obtained authority to communicate the full results of the testings, which were sent to him by Mr. Thomas Glover, of Norwich; and we have pleasure in reproducing them below. The actual names of the burners are here suppressed, by desire; but the figures are nevertheless highly instructive, and Mr. Glover deserves many thanks for communicating them.

"*A*" *Inverted Burner* (*Large*).

WORKING CONDITIONS.

Globe Used.—None.
Gas Used.—Mixture of 70 per cent. coal gas and 30 per cent. water gas.
Illuminating Value of Gas Used.—15·80 candles.
Air Supply.—Air-ports full open.

Angle Tested at.	Pressure of Gas. Inches.	Gas Consumed. Cubic Feet per Hour.	Candle Power of Burner.	Efficiency. Candles per Cubic Foot.
0°	2·5	3·5	58·5	16·7
12°	2·5	3·5	55·3	15·8
30°	2·5	3·5	62·5	17·8
40°	2·5	3·5	63 4	18·1
60°	2·5	3·5	69·8	19·7
70°	2·5	3·5	70·0	20 0
80°	2·5	3·5	82·1	23·4
90°	2·5	3·5	100·6	28·7

"*A*" *Inverted Burner* (*Small*).

WORKING CONDITIONS.

Globe Used.—Clear glass with hole in base.
Gas Used.—Mixture of 70 per cent. coal gas and 30 per cent. water gas.
Illuminating Value of Gas Used.— 15·59 candles.
Air Supply.—Air-ports full open.

Angle Tested at.	Pressure o. Gas. Inches.	Gas Consumed. Cubic Feet per Hour.	Candle Power of Burner.	Efficiency. Candles per Cubic Foot.
0°	2·5	1·65	21·5	13·0
12°	2·5	1·65	19·3	11·7
30°	2·5	1·65	23·1	14·0
40°	2·5	1·65	24·5	14·8
60°	2·5	1·65	29·1	17·6
70°	2·5	1·65	30·6	18·5
80°	2·5	1·65	36·6	22·1
90°	2·5	1·65	41·6	25·2

"*B*" *Inverted Burner* (*Large*).

WORKING CONDITIONS.

Globe Used.—None.
Gas Used.—Mixture of 70 per cent. coal gas and 30 per cent. water gas.
Illuminating Value of Gas Used.—15·59 candles.
Air Supply.—Air-ports half closed.

Angle Tested at.	Pressure of Gas. Inches.	Gas Consumed. Cubic Feet per Hour.	Candle Power of Burner.	Efficiency. Candles per Cubic Foot.
0°	2·0	3·5	48·7	13·9
10°	2·0	3·5	45·5	13·0
20°	2·0	3·5	45·5	13·0
30°	2·0	3·5	48·7	13·9
40°	2·0	3·5	58·1	16·6
60°	2 0	3·5	65·6	18·7
70°	2·0	3·5	75·6	21·6
80°	2·0	3 5	78·8	22·5
90°	2·0	3·5	90·0	25·7

"*B*" *Inverted Burner* (*Small*).

WORKING CONDITIONS.

Globe Used.—Clear glass.
Gas Used.—Mixture of 70 per cent. coal gas and 30 per cent. carburetted water was.
Illuminating Value of Gas Used.—15·59 candles.
Air Supply.—Air-ports half open.

Angle Tested at.	Pressure of Gas. Inches.	Gas Consumed. Cubic Feet per Hour.	Candle Power of Burner.	Efficiency. Candles per Cubic Foot.
0°	2·0	1·5	18·5	12·3
10°	2·0	1·5	18·4	12·3
20°	2·0	1·5	18·4	12·3
30°	2·0	1·5	21·0	14·0
40°	2·0	1·5	21·9	14·6
60°	2·0	1·5	27·3	18·2
70°	2·0	1·5	34·4	22·9
80°	2·0	1·5	36·3	24·2
90°	2·0	1·5	38·2	25·2

"*C*" *Inverted Burner.*

WORKING CONDITIONS.

Globe Used.—None.
Gas Used.—Mixture of 70 per cent. coal gas and 30 per cent. carburetted water gas.
Illuminating Value of Gas Used.—15·59 candles.
Air Supply.—Air-ports full open.

Angle Tested at.	Pressure of Gas. Inches.	Gas Consumed. Cubic Feet per Hour.	Candle Power of Burner.	Efficiency. Candles per Cubic Foot.
0°	2·4	3·7	55·3	14·9
10°	2·4	3·7	50·6	13·7
20°	2·4	3·7	51·2	13·8
30°	2·4	3·7	62·5	16·9
40°	2·4	3·7	62·5	16·9
60°	2·4	3·7	73·5	19·8
70°	2·4	3·7	84 1	22·7
80°	2·4	3·7	92·8	25·1
90°	2·4	3·7	117·8	31·8

OPERATING CARBURETTED WATER-GAS PLANTS.

[COMMUNICATED.]

THE details of carburetted water gas manufacture are a subject of great importance, now that it is made in such large quantities in this country. Comparative figures in connection with this branch of gas manufacture are conspicuous by their absence. This is much to be regretted, as managers who are anxious to obtain the best of results cannot procure any information as to the comparative merits of their own and their neighbour's working. "Field's Analysis" and other statistics not only entirely omit comparative figures in this branch of gas manufacture, but make the mistake of inserting them in conjunction with the figures for coal gas, with the result that these also become most misleading. One has only to compare the figures of the South Metropolitan Gas Company, who do not make water gas, with those of the Gaslight and Coke or any other large company who do, to observe how much they differ. It is only when papers are read at the meetings of the different Associations that one is able to glean any information as to the consumption of coke or oil in the making of carburetted water gas.

No one will deny that carburetted water-gas plant is a very useful adjunct in any works; and though few will be found to express the opinion that these plants actually produce gas more cheaply than coal-gas plant, yet it appears to the writer that if advantage be taken of the economical working of a Dellwik or a Kramers and Aarts generator to be used with a Lowe carburettor and superheater, the result would be infinitely more satisfactory than the use of a complete Lowe plant. Times have changed, and now it is quite usual to make carburetted water gas of a lower quality (both in illuminating and in calorific power) than coal gas. Thus it is not unusual for a Lowe water-gas plant to be found working with a consumption of oil about half that for which it was originally intended. It cannot, under these conditions, be expected that the plant will work so economically when making 14-candle gas as it did when making 28-candle gas. In producing the higher quality of gas, a larger proportion of the waste heat is used to vaporize the greater quantity of oil. With the consumption of a small quantity of oil, only a fraction of the waste heat is used; and thus the consumption of coke is proportionately heavy.

In Bryan Donkin's "Gas, Oil, and Air Engines," it is stated that the quantity of producer gas made in maintaining the fuel at a proper working heat exceeds the quantity of water gas by no less than four times. The question naturally arises as to how much of this gas is needed to maintain the carburettor and superheater at a proper heat. As an instance, take the case of a plant using 2 gallons of oil per 1000 cubic feet. In this case the illuminating power of the gas would be (say) from 14 to 15 candles. For gas of this quality only a small proportion of the generator gas is required to maintain the carburettor and superheater at a temperature suitable for vaporizing the oil.

The writer recently made some experiments with a Lowe water-gas plant, to ascertain just what quantity of the generator gas is actually needed for this purpose, and to ascertain whether economy would not result from an alteration of the usual methods adopted in working these plants. It is customary to maintain the fuel at a depth of about 9 feet; but this has certain disadvantages. In the first place, it needs a long blast for the proper maintenance of the heat; and, secondly, the percentage of carbon monoxide is higher than if a shallow bed of fuel is being used. It is well known that in burning carbon to carbon monoxide the

resulting heat is only a fraction of that caused by the complete combustion of carbon to carbon dioxide. To give actual figures, in burning 1 lb. of carbon to carbon monoxide, 2400 calories are liberated; while in burning the same quantity of carbon to carbon dioxide, 8080 calories are liberated—a quantity 3·3 times greater. Therefore for the economical heating of the generator fuel bed it is most important that as much as possible of the carbon should be burnt to carbon dioxide.

A reduction in the depth of the fuel brings about an appreciable increase in the percentage of carbon dioxide produced in the "blow," enabling its duration to be shortened by a full minute or more, and thus saving the consumption of coke. While carbon dioxide is being produced in greater quantities than carbon monoxide, the loss of heat is not very excessive; but as soon as the quantity of carbon monoxide becomes greater, the loss is very considerable. With a 7-feet fuel bed, the following test illustrates the force of this argument:—

Composition of "Generator" Gas during the "Blow."

	Per Cent. CO_2.	Per Cent. CO.
1st minute of "blow"	15·2 ..	5·0
2nd ,, ,, ...	13·0 ..	7·4
3rd ,, ,, ...	7·0 ..	13·4

If the blast were maintained during the fourth minute, the gas would consist almost entirely of carbon monoxide. Some further tests were taken of the gases on the outlet of the superheater after the supply of secondary air had been admitted in the carburettor, with the object of ascertaining the quantity of carbon monoxide required for the maintenance of the carburettor and superheater at the required temperature. In most cases it was found that a mere fraction, averaging about 1 per cent. of carbon monoxide, in addition to the hot waste gases (CO_2), was needed for this purpose; showing plainly that only a very small proportion of the producer gas is utilized in this manner. The result of these few experiments convinced the writer that a system in which carbon dioxide only is produced in the generator during the "blow" would be infinitely more economical for working in conjunction with a Lowe carburettor and superheater.

It is well known that in the Dellwik system the air-blast is admitted at high pressure, being at least double that used with the Lowe plant; while the depth of fuel is much shallower. By this means the duration of the blast is prolonged for about a minute only, instead of for three or four minutes, as with the Lowe plant. Thus it is possible in the Dellwik system to make 1000 cubic feet of gas with from 25 to 30 lbs. of coke, while with a Lowe plant a quantity of from 40 to 45 lbs. must be used.

To revert to the experiments above mentioned, it was found that by reducing the depth of the fuel from 9 feet to 6 feet, it was possible to shorten the "blow" by one minute—from 4 to 3 minutes—without altering the length of the "run." This resulted in a saving of about 4 or 5 lbs. of coke per 1000 cubic feet of gas, and also increased the capacity of the plant to an appreciable extent. At one time a fuel bed of 5 feet in depth and an air-blast of two minutes only, to correspond with a "run" of five minutes, were being worked; but it was found that this method of working was not altogether satisfactory. These alterations did not, as might have been expected, increase the quantity of carbon dioxide in the water gas. The writer is quite well aware that the combination of a Dellwik generator and a Lowe carburettor and superheater is not an original idea; but the preceding few points are mentioned to draw attention to a system which is worthy of adoption.

Since the foregoing observations were written, the writer has perused the description of the water-gas plant at Trieste given in the "JOURNAL" for April 10, 1906 (p. 111). Here was adopted a combination of the Dellwik generator and the Lowe carburettor and superheater. Arrangements were also made to enrich the blue water gas by the use of benzol if preferred. A series of trials were made—first with the manufacture of water gas alone, and then with water gas carburetted with a petroleum oil. In the latter test, 2·6 gallons of oil were used with a consumption of 33·8 lbs. of coke per 1000 cubic feet of gas. This result is greatly superior to that obtained with the Lowe plants, and quite bears out the anticipations of the writer when making the few tests he has described. This saving in the consumption of coke would represent an amount approximating to 1d. per 1000 cubic feet on that obtained in the Lowe plants, increasing at the same time the capacity of these plants to a very considerable extent.

"Erginis" is a liquid fuel which has found much application in Germany. According to the "Engineer," it is obtained from tar by a secret process, and is reported to have a heating power of 16,500 B.Th.U. per pound.

At a recent meeting of the Paris Academy of Sciences, the subject of the heat of combustion and formation of gaseous hydrogen phosphide was dealt with by M. Lemoult. The measurement has hitherto been made by indirect methods only. The author has carried out direct measurements by exploding hydrogen phosphide with oxygen in the calorimetric bomb. Observations were made with a Mahler enamel-lined bomb and with a Berthelot platinum-lined bomb; and the results agreed within about 0·5 per cent. The molecular heat of combustion of phosphoretted hydrogen is 310 calories at constant volume, and 311·2 calories at constant pressure.

THE MUNICH CARBONIZING CHAMBERS.

(*Continued from p.* 440.)

Report by Dr. H. Bunte on the Investigation of the Working of the Settings by the Instructional and Experimental Gas-Works of the German Association of Gas and Water Engineers.

THE report is dated June 1, 1907; and is addressed from Carlsruhe to the Management of the Municipal Gas-Works of Munich. It is a lengthy document; but all the more important portions are abstracted in the following summary of its contents.

The investigation was suggested to Dr. Bunte by Herr Ries, the Manager of the Munich gas undertaking, and was willingly undertaken, because of the specially interesting characteristics of the new system of chamber carbonizers. It was carried out under Dr. Bunte's direction by Dr. Henseling, the Assistant-Engineer of the Instructional and Experimental Works, and Herr Zschimmer, the Chemist to the Bavarian Inspection Union at Munich, with the assistance of Herr Rauch, the Works Assistant, and Dr. Schumann, the Chemist of the Munich Gas-Works. The investigation was made from the 7th to the 16th February last, and a large number and variety of observations were made, the import of some of which has not yet been ascertained. The present report is, therefore, only preliminary.

The report refers first to the changes which recent years have witnessed in the construction of gas-retort settings, with a view to facilitating charging and discharging, and to relieving the stokers. But the inclined retorts introduced with these objects are, it states, of similar size to the older retorts, and do not offer any solution of the problem, which becomes more imperative with the increase in the size of gas-works, of the manipulation of such a large number of relatively small vessels. The coke-oven could not be forthwith transplanted into gas-works, because it was not adapted to the condition which prevails there, of being able to accommodate its output to the variations in the consumption of gas. The first successful attempt to adapt coke-oven practice to gas-works conditions has been made at the Munich Gas-Works. But the changes which have taken place of late years in the mode of using gas for lighting, and the increase in its use for heating purposes, have primarily facilitated the development of gas manufacture in the direction just referred to. The quality of gas must now be judged by its calorific power; and if its illuminating power in a flat-flame or argand burner is still ascertained, no considerable importance need be attached to its properties in that respect. There is no generally accepted standard of calorific power; but the following are the average values for the last two years for the gas supplied in certain large towns.

Gross Calorific Power.

—	Calories per Cubic Metre at 0° C. and 760 mm.	B.Th.U. per Cubic Foot at 60° Fahr. and 30 inches.
Berlin	5400	574
Magdeburg	5090	541
Bonn	5288	562
Breslau	5433	578

It thus appears that, generally, gas of an average gross calorific power of 5000 to 5500 calories per cubic metre (532 to 585 B.Th.U. per cubic foot at 60° Fahr. and 30 inches) is considered a satisfactory product; and the gas made by the Munich chamber settings has been valued according to such a standard.

Passing on to the actual investigation, the report states that seven tests, each of 24 hours duration, were conducted between Feb. 7 and 16 last. One series of tests, from Feb. 7 to 11, aimed at following the course of the distillation of the coal in detail and the changes in the quality of the gas. The nine chambers were therefore charged as nearly as possible at the same time, and all discharged at the end of 24 hours. A second series of tests, made from Feb. 13 to 16, aimed at studying the duty of the settings in continuous work; and the chambers were therefore charged and discharged one after the other as in ordinary working. A mixed gas was thus obtained; whereas in the first series the chambers acted as one large chamber, and the changes in the quality of the gas in the course of the 24 hours' working off of the charge were clearly exhibited.

The coal used was "Heinitz I," a Saar coal of normal character, having the following average composition: Moisture 2·4 per cent., ash 7·1 per cent., and coal proper 90·5 per cent. The coal proper consisted of: Carbon 85·02 per cent., hydrogen 5·38 per cent., oxygen 7·28 per cent., nitrogen 1·22 per cent., and sulphur 1·10 per cent. The moisture in the coal ranged from 2·22 to 2·56 per cent. on the different days of the trials, and the ash from 5·55 to 8·44 per cent. The calorific value of a sample of the coal containing 6·27 per cent. of ash and 1·98 per cent. of moisture was 7415 calories per kilo. (13,347 B.Th.U. per lb.).

The general results of the trials were given in the "JOURNAL" for June 18 (p. 810); but the annexed table, prepared from the tables in the report, gives further particulars—see p. 502.

The coke used for heating the settings was from Saar coal, and a sample of that used on the 8th and 9th of February contained 8·68 per cent. of ash and 7·73 per cent. of moisture, and had a

Trials with Saar Coal of Three Settings, each Containing Three Chambers.

—	Individual Trials, each of 24 Hours Duration.							Average per 24 Hours.	Absolute Totals. Average per 24 Hours.
	Chambers Charged Simultaneously.				Chambers Charged as in Ordinary Running.				
1907, February	7-8.	8-9.	9-10.	10-11.	13-14.	14-15.	15-16.		
Coal carbonized	..	..	..	..	..	..	..	..	452¾ cwt.
Coke (dry) used for heating; per cent. of weight of coal	14·83	16·37	16·06	16·31	14·05	14·55	15·07	15·32	69¼ ,,
Average temperature of setting; degrees Fahrenheit	2,269	2,318	2,260	2,178	2,385	2,277	2,313	2,286	..
Make of gas; cubic feet per ton, at 0°C. and 760 mm	11,131	11,027	10,848	10,748	10,232	10,593	10,550	10,733	242,590 cb. ft.
,, ,, ,, ,, ,, 60° Fahr. and 30 inches	11,762	11,652	11,463	11,357	10,814	11,194	11,148	11,342	256,345 ,,
,, ,, per cent. of weight of coal	16·44	16·59	15·11	15·87	13·97	15·35	15·29	15·55	69¾ cwt.
Gas—									
Specific gravity	0·41	0·41	0·38	0·41	0·38	0·40	0·40	0·40	..
Illuminating power in slit burner; Hefners per 150 litres (5·3 cb. ft.) at 0°C. and 760 mm	11·59	10·94	11·23	12·59	12·22	12·41	12·17	11·88	..
Illuminating power in slit burner; candles per 5 cb. ft. at 60° Fahr. and 30 inches	9·41	8·88	9·12	10·22	9·92	10·08	9·88	9·65	..
Calorific power; gross, calories per cubic metre at 0°C. and 760 mm	5,870	5,769	5,837	5,936	5,916	5,938	5,946	5,887	..
Calorific power; gross, B.Th.U. per cubic foot at 60° Fahr. and 30 inches	624	613	621	631	629	631	632	626	..
Coke obtained (dry); per cent. of weight of coal	67·88	66·17	67·71	63·97	67·01	68·19	66·57	66·77	303 cwt.
Tar and liquor; ,, ,, ,,	13·63	12·82	13·04	13·04	14·71	13·66	13·16	13·44	61½ ,,

calorific value in that state of 11,928 B.Th.U. per lb., or in the dried state of 12,890 B.Th.U. per lb. The heating of the settings was checked by tests at short intervals. The products of combustion in the flues had a uniform composition; showing on the average 18 per cent. of carbonic acid and about 2 per cent. of oxygen. The temperature was observed with the Wanner pyrometer at many places, both at the charging and discharging ends and on the right and left of the chambers; and, with small fluctuations, it averaged about 1250°C., or (say) 2280° Fahr. The mean temperature in the individual trials is shown in the table. It was found that any attempt to reduce the degree of heating towards the close of carbonization disturbed the working of the settings. The coke consumption for heating the settings was carefully checked by weighing throughout; the moisture in the coke used being determined so that the results could be recorded on a uniform (dry) basis. The consumption shown in the table for the second series of trials, when the chambers were charged as in ordinary working, more nearly represents the normal consumption of the settings, as in the first series some of the retorts remained empty for a time between discharging and re-charging. The average consumption of coke (dry) in the producers in the second series of trials was 14·56 per cent. of the weight of coal carbonized. The coke was used cold; whereas in ordinary practice results more favourable (by, say, a 5 per cent. diminution) would be obtained through the use of hot coke.

Special arrangements were made for ascertaining exactly the quantity and quality of the gas made. A special train of apparatus was cut off from the rest of the plant at the Kirchstein works (where the chamber-settings are) at Munich, and two station meters, which had been carefully rated immediately before, were used for measuring the gas made. A 1½-inch branch led a stream of purified gas from the outlet of the meters to a well-ventilated photometer room, where half-hourly determinations were made of specific gravity, illuminating power, and calorific value. Samples of the gas were taken every hour and sealed in glass tubes for subsequent examination. The make of gas is shown in the table, and is considered high for Saar coal even of the best quality. The coke appeared very thoroughly exhausted of gas. The gas was treated and purified in the usual manner. The quality of the gas, as indicated by the calorific power and illuminating power shown in the table, is considered as quite normal or good. The specific gravity of the gas was taken for the purpose of calculating the weight of gas made—not as a criterion of quality.

The yield of coke is shown in the table; and its composition has been indicated in connection with what has already been said in regard to the coke used for heating the settings. Its appearance was characteristic, and quite indicative of the density, hardness, and structure of foundry coke. This indication was borne out in the sorting of the coke, 100 parts of which yielded on the average 92·2 per cent. of large coke, 1·4 per cent. of medium, 3·8 per cent. of small, and 2·6 per cent. of fine breeze. The tar and liquor produced were collected and weighed at regular intervals, and on the average amounted to 13·44 per cent. of the weight of coal carbonized. On separation, 6·14 per cent. proved to be crude tar, and 7·30 per cent. liquor. The tar appeared to be normal in character. The liquor contained on the average 2 per cent. of ammonia; so that there was a yield of 0·211 per cent. of ammonia (0·82 per cent. of sulphate) on the weight of coal carbonized. This is equivalent to 4·73 lbs. of ammonia or 18·35 lbs. of sulphate per ton of coal. This yield is considered very high for Saar coal. The yield of ammonia from this coal in the ordinary retort-settings is 0·135 per cent. of the weight of the coal. This indicates that the chambers give about a 50 per cent. greater yield of ammonia than ordinary retorts.

The Course of Carbonization in the Chambers.

The course of gas production during the period of 24 hours' carbonization in the chambers is quite characteristic. These chambers take a charge 8 to 16 times the weight of that of an ordinary gas-retort; and 24 hours are allowed for working off, in place of four or five hours. The influence of this change of conditions on the nature and quantity of the products had therefore to be ascertained. The results of the observations made were plotted out on diagrams; and it appeared therefrom that the conditions were practically identical in all the trials, so that the first day's trial may be taken as typical, and used for a general consideration of the course of distillation in the chambers.

Gas Production.—Immediately after charging, the rate of production of gas attains its maximum, which, however, does not greatly exceed the average. It falls off in the course of the first three or four hours to a tolerably uniform mean rate, and decreases only gradually up to the end of 17 hours. From 18 hours the production shows a rapid falling off, and practically comes to an end at 24 hours.

Illuminating Power.—The illuminating power, measured in a slit-burner at the rate of 150 litres at 0° C. and 760 mm. (5·6 cubic feet at 60° Fahr. and 30 inches) per hour, rises in the first hour to a maximum of about 24¾ candles (per 5 cubic feet, corrected), falls sharply to about 14½ candles at the end of the second hour, and then more gradually to 12·2 and 10·5 candles at the close of the third and fourth hours. It then remains fairly uniform to the end of the twelfth hour, whence it falls off at a fairly regular rate to about 4·9 candles at the close of the seventeenth hour. The fall continues till at the end of the period of distillation the illuminating power becomes practically *nil.*

Calorific Power.—The calorific power is more constant, owing to the greater persistence in the gas made of methane, to which it is largely due, than of ethylene, which is the chief source of the illuminating power. In the first hour a maximum value (gross) of about 890 B.Th.U. per cubic foot (at 60° Fahr. and 30 inches) is attained; and there is then a gradual fall to 640 B.Th.U. at five to six hours. The value remains virtually constant until eleven hours, when a very gradual fall sets in, and continues tolerably uniformly to the close of the period of carbonization, by which time the value has dropped to about 420 B.Th.U. The resultant mixed gas has, as already shown, a value of about 625 B.Th.U. per cubic foot.

Specific Gravity.—From a maximum of about 0·6 in the first hour, there is a fairly regular fall to about 0·3 at the close.

Bye-Products.—The make of tar and liquor is naturally highest at the early stages; but it does not decrease very rapidly, as might be expected, until the last six hours or so are reached.

The temperatures in the dip-pipe, and before and after the condenser, have been recorded diagrammatically; but the records are not reproduced with the report as published.

The report concludes with a discussion of the advantages of the chamber settings over retorts; but as no points appear to be raised which have not been covered in Herr Ries' paper, of which a translation was given in last week's "JOURNAL," it is unnecessary to reproduce this portion.

An interesting feature of the recent meeting of the British Association at Leicester was a joint discussion between the Engineering and Chemistry Sections on "Gaseous Explosions, with Special Reference to Temperature." In the course of it, Professor Harold B. Dixon gave an account of the methods he had employed for determining the specific heat of gases at high temperatures. Up to 400° C., compressed gases can be heated in steel bombs and dropped into a water calorimeter—the rise of temperature due to the steel being corrected by blank experiments. A distinct though small rise in the specific heat of carbon dioxide was thus established. A second method was to heat the gas in a tube 18 inches long, and measure the velocity of sound in the heated gas. By this means the specific heat of air and nitrogen and carbon dioxide up to 400° C. had been determined. The rise in the specific heat of carbon dioxide so found agreed well with the results obtained by Helbronn at Berlin.

IRISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Dublin.

The Annual Meeting of the Irish Association of Gas Managers, which took place in Dublin on Tuesday last, was the second in succession to be held in the Capital of Ireland; the reason for this being that the meeting last year was fixed in view of the anticipation that the International Exhibition was to have been held in Dublin in 1906. Though the anticipation was not fulfilled, the fixture of the meeting for Dublin was not altered; and when the Association met last year, it was felt that they were shut up to meeting again in Dublin in the Exhibition year. The gathering last Tuesday was held in the Lecture Theatre of the Royal Dublin Society, in Leinster House, Kildare Street—the same place as the Institution of Gas Engineers met in last June. When it is considered that there were doubts as to whether, in view of the meeting of the Institution, the Association should hold their meeting as an independent fixture, or whether they should not make theirs simultaneously with that of the Institution, and so obviate the call upon the members to travel twice to Dublin in the course of one summer, it was very gratifying to find that the gathering which met under the presidency of Mr. T. J. Reid, of Ballina, did not suffer in the matter of attendance by comparison with previous meetings, but was, in fact, better than some of them.

Welcome to the City.

Mr. Francis T. Cotton, on behalf of his father—Alderman W. F. Cotton, J.P., D.L.—expressed his father's regret at not being present to extend a hearty welcome to the Association. He had been detained in London, and could not possibly be with them. He could assure them that his father was looking forward with the very greatest pleasure to the opening of the proceedings of the meeting; and it was a matter of great disappointment to him that he could not be there. On his father's behalf, he declared the proceedings open.

Reports of the Committee and Auditor.

The Hon. Secretary (Mr. James Whimster, of Armagh) read the report of the Committee, which was as follows:—

The past year has been an eventful one in the annals of the gas industry in Ireland, on account of the most successful meeting of the Institution of Gas Engineers held in Dublin last June, and the interesting and comprehensive display in the Gas Pavilion of the Irish International Exhibition.

The remit which you made to your Committee from the last annual meeting, to take steps to welcome the Institution and to further the interests of the gas profession on the occasion of their assembling in Dublin, had your Committee's most careful attention. The result of their deliberations was the decision to hold our own annual meeting as usual in August, and to write to the Council of the Institution, assuring them of our pleasure at their intended visit to Ireland, and proffering any assistance in our power towards making their meeting a success and the visit a pleasant one for their members. Simultaneously with this action on our part, the Council of the Institution very generously invited a selected number of our members to represent this Association and form an Advisory Committee with the Council in making general arrangements for the meeting, and at the same time offered cards of admission to the meetings, with all the advantages (for the time being) of membership of the Institution, to all our ordinary members—a boon which your Committee were glad to see was highly appreciated and taken advantage of. This meeting, in the estimation of the Committee, amply demonstrated the wisdom of our becoming affiliated with the Institution.

The Committee are also pleased to see that one of our members had been elected an ordinary member of the Council of the Institution—Mr. Francis T. Cotton, of Dublin, a gentleman whose services in connection with the recent meeting cannot be over-estimated, and whom we heartily congratulate on his election.

Mr. Airth, your District Representative on the Council for the past year, reports as follows:—

> "I have attended all meetings of the Council of the Institution of Gas Engineers to which I was summoned.
>
> "The Council are endeavouring to get the Public Health and Local Conferences Act of 1885 so amended that all public bodies will be able to pay their engineers and managers expenses to our conferences. No definite progress can as yet be reported; but it is hoped that further representation to the Local Government Board may result in the achievement of this object.
>
> "Reduced railway fares, at the rate of fare-and-a-quarter have been granted by the Associated Railways to the Institution meeting in Dublin this year; and it is hoped that this will now become the regular fare to our meetings. It will all depend, however, on whether the members secure their tickets through the Secretary of the Institution, because if not, it will count against the privilege being again granted.
>
> "The examinations in Gas Engineering and Supply have, on the recommendation of the Council to the Technology Committee of the City and Guilds of London Institute, been further augmented by the inclusion of a separate examination in Gas Distribution. This will appear on the syllabus under the title of 'Gas: Its Distribution and Applications,' and will no doubt further enhance the value of these certificates to those who hold them.
>
> "The Council, after consultation with Professor Smithells, have established at the University of Leeds an 'Institution Fellowship in Gaseous Fuel' under Professor Bone, of the value of £100 per annum, and have promised to meet the incidenta expenses in connection therewith."

Mr. R. B. Anderson, our ex-President, has been duly elected our District Member of the Council for the current year.

The Committee have to deplore the loss of our old and valued friend Mr. F. Daniel Jones, of Dublin, who was a familiar figure at our annual gatherings, but who, during the past year, has been called over to the majority.

The abstract of accounts and Auditor's report presented herewith show a balance in hand of £70 4s. 1d.

The retiring members of the Committee are Messrs. Brodie, of Omagh, Allen, of Sligo, and Eustace, of Tullamore, who are not eligible for immediate re-election.

The Hon. Auditor (Mr. G. W. Norman, of Dublin) read his report, which certified the accounts to be correct.

The President moved the adoption of the reports.

Mr. P. Conroy (Galway) seconded, and the motion was adopted.

New Members.

The Hon. Secretary read the following list of applicants for admission to membership of the Association, and moved their election.

Ordinary Members.—Anderson, George W., Assoc.M.Inst.C.E., of Westminster; Kendrie, Jas., of Midleton, Co. Cork; Savile, G., of Drogheda; Watson, Mortimer, of Limavady.

Extraordinary Members.—Curtiss, Gerald, of Dublin; Galloway, D. B., of London; Phillips, L. P., of Dublin; Woods, R., of Dundrum.

The motion was agreed to.

Election of Office-Bearers.

Mr. R. Harrison (Monaghan) proposed that Mr. T. Frizelle, of Holywood, be elected President for the year. Mr. J. F. Tyndall (Wicklow) seconded; and the motion was agreed to.

Mr. Frizelle said he appreciated the honour they had conferred upon him. It had been unsought for by him; therefore it was the higher honour to him. He heartily thanked them, and invited the Association to come to Holywood next year, where he was sure they would be made heartily welcome.

Mr. F. J. Clarke (Ballinasloe) proposed that Mr. F. Eustace (Tullamore) be elected Vice-President. Mr. J. G. Tooms seconded; and the motion was agreed to.

Mr. Eustace thanked the members heartily for the honour conferred upon him.

Messrs. B. Mitchell (Bangor), J. E. Enright (Tralee), and R. Young (Youghal) were unanimously elected as Members of the Committee.

Mr. R. Bruce Anderson (Westminster) moved, and Mr. J. Grant (Tipperary) seconded, that Mr. Whimster be re-elected Hon. Secretary and Treasurer. The motion was agreed to.

Mr. Whimster returned his hearty thanks for the members' appreciation of his work as Secretary, as shown by their having cordially re-elected him. He had often said he would like it if they would make another choice. He would not keep on saying this; but as he had been nearly twenty-one years Secretary now, he thought it was time that someone else had a look in.

Mr. G. Airth (Dundalk) proposed that Mr. Norman should be re-elected Auditor; and this was agreed to.

Next Place of Meeting.

The President said that Mr. Frizelle had invited them to meet at Holywood next year. He thought they should accept this invitation; and he moved accordingly.

Mr. R. Pollock (Mauchline, Scotland) seconded; and the motion was agreed to.

The President's Address—Presentation of Medal.

The President then delivered his Presidential Address, which was given in the "Journal" last week (p. 441).

Mr. R. Bruce Anderson proposed a hearty vote of thanks to Mr. Reid for his most interesting and comprehensive inaugural address. He had dealt with a multifarious number of topics. It was not open to them to discuss the address; and although the President had humbly said there were certain points upon which they might not be in agreement with him, he was sure that, when they read the address, there would be very few points upon which they would not be in agreement with him. The President had been one of them for a very long time. He had been a most active member of the Association; and in electing him as their President, it was unanimously felt that they had got a very fitting man for the post. As it had become customary now in the Association, it became his very great pleasure indeed to decorate their worthy President with a very beautiful medal, which those who had already received it prized so highly. [He then placed the medal upon the President's breast, and assured him that it was a goodwill offering from all the members of the Association.]

The PRESIDENT begged to thank the members for the way in which they had received his address, and particularly Mr. Anderson, for the words he had spoken. In moments like this, when one was groping in his mind for the proper words to give expression to his thoughts, he generally fell back upon platitudes; and if he used the old platitude that this was the happiest moment of his existence, he should be simply saying what was the perfect truth. Mr. Anderson had said that he took an interest in the Association. He had done so; and he only regretted that he had not been in a position to take more interest in it. His remarks that day had been devoted to trying to provoke greater interest in the Association; and he sincerely trusted that what he had said would not be forgotten, but that next year their Secretary and President would not have the difficulty they had had this year in getting members to come forward and do something for the Association. He assured them the memento of a most interesting year which they had presented to him would be greatly prized.

A VISITOR FROM THE NORTH BRITISH ASSOCIATION.

The PRESIDENT observed that they had with them the President of the North British Association of Gas Managers, and he invited him to take a seat with them on the platform.

Mr. W. BLAIR (Helensburgh), having complied with the request, said he was very pleased to be with them once again. He had the pleasure of attending the meeting of the Association at Cork; and the hospitality and good fellowship he was shown by his brother gas managers in Ireland induced him to visit them once more to renew the friendships then formed, and also to see if there was anything to be picked up in the Exhibition in Dublin. He had listened with great interest and pleasure to the address of their worthy President. It contained a deal of matter which they would derive great benefit from, once they took it to their own firesides, and read it in the quiet of the evening. The President had been dealing ostensibly with small works; but he (Mr. Blair) thought that those who were in charge of larger works would receive a lot of benefit from it, for it was only in small economies that they could make any progress.

THE READING OF PAPERS.

The reading of papers, and the discussions upon them, were then taken. The papers were: "A Plea for Equality to Slot-Meter Consumers," by Mr. R. F. BYRON, of Nenagh (see p. 505); and "The Advisability of Installing a Water-Gas Plant in Small Works," by Mr. W. H. ROBERTS, of Newtownards (see p. 507).

VOTES OF THANKS.

Mr. J. G. TOOMS proposed a hearty vote of thanks to the President for his distinguished conduct in the chair. When he was elected to that honourable position, each and all of them knew and felt that he would worthily fulfil the duties of the office to which he was then elected. He could assure the President, on behalf of the members, that they were more than satisfied with his occupation of the chair.

The PRESIDENT said he had again to thank them for their approval of his services to the Association.

The meeting then terminated.

THE DINNER.

In the evening, the members and friends, including a goodly proportion of ladies, dined together at the Palace Restaurant in the International Exhibition.

Mr. W. BLAIR (Helensburgh) proposed the toast of "The Irish Association of Gas Managers," which the PRESIDENT acknowledged, and proposed the toast of "Kindred Associations," which was acknowledged by Mr. R. POLLOCK, of Mauchline, who said he was proud to be a member of both the North British Association and of the Irish Association. Among the other toasts proposed were "The Press," by the HON. SECRETARY, and "The Hon. Secretary," by Mr. R. BRUCE ANDERSON, both of which were acknowledged.

After the dinner, the members inspected the Exhibition.

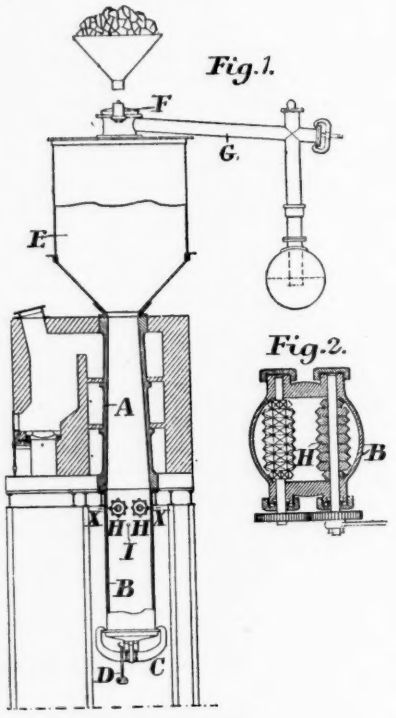
On Wednesday an excursion took place to the Shannon Lakes, which was well attended.

A FRENCH VERTICAL RETORT.

The current number of "Le Gaz" contains the specification of a patent taken out by M. Oscar Guillet for a new arrangement of vertical retort.

The patentee points out that all the processes hitherto employed for the distillation of coal, especially with a vertical retort, are attended by certain inconveniences. If the operation is continuous, and small quantities of coal are successively thrown into a partially filled retort, the result is superheating and decomposition of gas. If, on the other hand, the operation is intermittent—the retort being completely filled and emptied at suitable intervals—the plant works irregularly, and does not allow of the utilization of the heat carried away by the glowing coke at the time of discharging the retorts. The apparatus which forms the object of the present invention has been constructed with a view to ensure the production of a greater quantity and better quality of gas, and the prevention of obstructions from tar and naphthalene.

In the accompanying illustration, fig. 1 is a vertical section of the retort; and fig. 2 (on a larger scale) a horizontal section along the line X of fig. 1.



French Vertical Retort.

The apparatus consists of a retort A, placed vertically in a suitable setting, which may be slightly cone-shaped to facilitate the fall of the charge. The retort is prolonged at the lower part by a cylinder B, closed with a water-tight plug C, which can be opened with a lever working an eccentric or any other suitable device. The retort is connected at the top part with a closed receptacle E, of sufficient capacity to hold the coal required for 12 to 24 hours' work, and also closed at the top with a water-tight plug F. A pipe G is branched on the receptacle for conveying away the gas. The cylinder B is crossed at the upper part by two suitably pivoted shafts, carrying pointed discs forming two coke-breaking cylinders H—the space between which is regulated so as to prevent the coke falling between them unless they are revolving. Moreover, the breakers can be replaced by any device which makes it possible to cause the fall of the coke, when required, into the box below—communication between the cylinder B and the retort remaining permanent. In the cylinder and below the coke-breakers (at the point I, for example) there is a spray of water, regulated in proportion to the result desired to be obtained. The object of this spray will be explained later.

Supposing the retort is filled with coal and at red heat, the receptacle E being full, if by suitable mechanism the two coke-breakers are made to rotate, for example, one quarter turn, a certain quantity of coke will be liberated from the retort and fall into the cylinder below. The charge in the retort will drop to the same extent, and a corresponding amount of coal will be fed into the retort from the receptacle E, the heating zone of which will, with care, be obtained as high as possible—*e.g.*, in the first third of the total height. This mass of coal will arrive in the form of a horizontal layer, and distillation will commence immediately. The gas produced will come into contact with coal which is gradually colder. It will thus be preserved from all decomposition, and at the same time will give off heat to the coal. Moreover, it will be filtered, so to speak, in the higher mass of cold coal, which will free it from a large portion of its impurities, more especially the heavy tars.

At the end of the period considered sufficient for the distillation of the layer of coal, the mechanism will again cause the cylinders H to revolve one quarter turn, and thus feed in the coal regularly. On the other hand, the spray of water falling on the hot coke on the bottom of the cylinder produces steam, which ascends through the mass of red-hot coke and cools it progressively. When it reaches the hot zone of the retort, it is decomposed in contact with the incandescent coke, and thus produces combustible gases which augment the volume of those given off by the coal. The same operation is continued until the cylinder B is almost filled with quenched coke. The plug C is then rapidly removed, and the coke drops to the ground.

Every twelve or fourteen hours, according to its capacity or to the period considered necessary for distillation, the receptacle E is filled with coal by means of a hopper above, as shown, or by any other arrangement whereby continuous distillation is ensured. One or several retorts can be placed in the same setting, so as to form a more or less powerful bench, according to requirements.

A PLEA FOR EQUALITY TO SLOT CONSUMERS.

By R. F. Byron, of Nenagh.

[A **Paper read before the Irish Association of Gas Managers, Aug. 13.**]

There is no matter connected with our industry that requires adjustment more than the present various systems of supplying gas through the prepayment or slot meter; and this must be my excuse for coming before you to-day with a paper containing nothing new or original.

Ireland is the home of small gas-works; and because of the heavy freight on our goods, the price of gas is, generally speaking, so high, that gas must be considered a luxury to the average prepayment consumer, who is not of the class that can afford luxuries. Therefore, if he will indulge in luxuries, let us encourage him by giving him our commodity at as reasonable a price as to his neighbour of the ordinary meter who purchases on credit. In any other commercial business, the cash customer obtains some little concession denied to the credit customer. Why should our business be an exception to this rule? True, the slot or cash consumer does not require as much gas as he of the ordinary meter; but is it for this reason that he is compelled to pay an extra price for his gas? In pleading for equality to the slot consumer, the writer only asks to have him placed upon equal terms with the ordinary consumer.

The prepayment meter has brought great wealth to many gas undertakings; so let us consider some of the methods by which the slot consumer is supplied with gas at present: (1) An additional price per 1000 cubic feet is charged to slot consumers in lieu of meter-rental. (2) All fittings and cookers are supplied, for which the gas authority seeks to pay itself by charging an extra price per 1000 cubic feet. (3) All fittings and cookers are supplied absolutely free of charge; the price of gas being the same as paid by the ordinary consumer. (4) All consumers are supplied upon similar conditions, except that prepayment meters are supplied free of rent.

The writer's experience of the first system of working is that it defeats the very object for which the slot-meter was intended—namely, to entice the outside public to become consumers of gas. He adopted this plan. But progress was so slow that he decided to give up the idea of charging any meter rent to slot consumers; and since doing so his number of prepayment consumers has steadily increased. One very great objection to the system is that consumers do not pay an equal proportion of meter-rental. He who should be encouraged (the good gas consumer) is forced to pay, in extra fees, perhaps five times the amount taken from another consumer with the same size of meter. Even among prepayment consumers themselves, therefore, there can be no equality with this system.

The second method is that adopted by many gas authorities in Ireland; so let us see how it works out. Take the average cost of fitting up a house with prepayment meter, cooker, one pendant, and two brackets, piping, &c., to be £5. Upon this sum it is usual to charge 10 per cent. for interest and depreciation—equal to 10s. per annum. Therefore, at an extra fee of 7½d. per 1000 cubic feet of gas sold, it is necessary to have a yearly sale of 16,000 cubic feet per meter before the gas authority's demands are satisfied in full. This average, the writer ventures to say, is very seldom reached in Ireland. Possibly this accounts for the fact that in some places the loading is as high as 1s. per 1000 cubic feet. The above remark about the good consumer being compelled to pay more than his share of rental applies here too; for he who burns 12,000 cubic feet of gas per annum pays four times the amount of rental accepted from his neighbour who burns only 3000 cubic feet yearly. Again, to fit up one man's house as he requires it done may cost only £1 10s., and in the next house an expenditure of £5 is necessary. Each consumes 10,000 cubic feet per annum, and, consequently, each pays the same rental. Surely, this is not as it ought to be. By straightforward dealing alone is it possible to retain the confidence of the public. Therefore, if an impression gets abroad that the gas company are not charging equal rental to their slot consumers, the success of the system is greatly interfered with. If the prepayment consumer is worth having, surely he is worth encouraging. With this system, there is no equality either.

Very heavy capital charges are involved in the third method of working; and it is the writer's opinion that, owing to the encouragement given to the very small consumer by the free fitting of his house, a considerable portion of the capital remains unproductive. What guarantee has the gas authority that such an investment as this will return a fair rate of interest? Is there not a distinct encouragement to the consumer to get what fittings he can out of the gas company, though he may never intend using some of them? Is not the ordinary consumer—the goose that lays the golden eggs—compelled to pay for his own fittings, while the slot consumer is supplied absolutely free of all cost? Therefore, there is no equality as between the prepayment and the ordinary consumer in this system.

The last method of supplying gas to the slot consumer is adopted by only a few gas authorities in Ireland—Nenagh being among the number. Under this system, the prepayment meters are supplied free; this being the only advantage given to the cash consumer. Wherever a cooker is required, a separate meter is supplied, so as to keep an exact record of the gas consumed for different purposes.

The average price required from the slot consumers in Nenagh is 6s. 5·24d. per 1000 cubic feet, as compared with 6s. 6·87d. demanded from the ordinary consumers, meter-rent included. But the amounts received were 6s. 5·29d. and 6s. 6·41d. per 1000 cubic feet, respectively—thus proving that the slot meter is a thoroughly reliable instrument.

At the end of his last financial year, the writer found that, of the total amount of gas disposed of, 23·49 per cent. passed through prepayment meters, with the result that his manfacturing expenditure showed an aggregate decrease of 3·03d. per 1000 cubic feet of gas sold.

Perhaps you will say that the expense of fitting up their own houses should be met by the same arguments as were advanced against the rental system—that of keeping the probable consumer away from you. To a certain extent, this is true. Undoubtedly, the public will not accept your services as quickly as if they were supplied with free fittings. But eventually they do come. On the other hand, the writer thinks that the fact of having to pay for his own requirements has the effect of keeping away the very small consumer. When the fittings are the property of the consumer, he will use them unless he is neglected in some way; but when the tenant has no interest in the fittings, he may tell you to remove them for some imaginary fault.

We cannot expect absolute equality in a matter of this kind; but should we not endeavour to get as near to it as possible? To do so we must, in my opinion, abolish meter-rents in every shape and form. The saving of 3·03d. per 1000 cubic feet is more than sufficient to pay the rent of all the meters in Nenagh twice over, thereby showing that there is a general gain to the Company through the profits on the consumption by consumers who would not otherwise have taken gas. If the price of coal will allow him to do so, it is the writer's intention to recommend such a step to his Directors; and, should they agree, all consumers will be on a perfect equality.

In conclusion, it is not the writer's intention to expatiate on the many other benefits to be derived by the introduction of the slot-meter, as they are already well known to you. In pleading for equality to the slot consumer, you are asked to remember that there are certain classes ready to have gas if they could obtain it in such a way and on such conditions as would suit their purses, as those consumers are not, generally speaking, blessed with an overabundance of this world's goods. Therefore, encourage them by supplying them at the same price per 1000 cubic feet as that charged to the ordinary consumer. The writer believes that this can be done with advantage to the gas authority; for what is being done at Nenagh can be done elsewhere. We should remember that by helping others we help ourselves.

Discussion.

The President (Mr. T. J. Reid, of Ballina) said they had heard a paper on a matter of interest to everyone. As he had hinted in his address, his opinion was that slot-meter consumers demanded particular attention—attention different from that which would be given in the larger towns. He had told the members of the policy pursued by railway companies, which was to charge what the traffic would bear. Gas managers sometimes had to charge what appeared to be unjust to their ordinary consumers; but sometimes this was a matter of expediency.

Mr. T. Frizelle (Holywood) said the paper was a capital one, and appealed to all members of the Association, as they all had to do with slot meters. Some did well, and others not so well. Mr. Byron had given his views very lucidly. Perhaps his (Mr. Frizelle's) place would come in under No. 4. He never did charge meter-rent for prepayment meters, though they cost more. He found, on beginning this business some years ago, that they could not induce the class of consumer which they wanted to get to pay extra money for the gas or a meter-rent. These customers wanted everything they could get, equal to the large consumers. When he looked into the question, he did so from the standpoint that these were poor people, and were a class of inhabitants who had never burned gas—nothing but oil and candles; and he thought if they could capture them it would come to something handsome. The first thing to do was to go to the small shops where oil was sold to poor people—to those who were making a living by it. They asked these shopkeepers to take gas. In the majority of the cases there were paraffin lamps in the shops. They told the shopkeepers that one incandescent gas-burner would give more light than three of the oil-lamps they had, and at less cost. They would thus get the incandescent light introduced into one shop. Then the opposition shop would have gas, and gradually they put gas into all the oil-selling shops. They had in this an advertisement to those who bought the oil—that when the people who made a living by selling oil were burning gas, it must be cheaper for them also to burn gas. The result was that they tapped the greater number of the poor people of Holywood in this way. They put the gas into these people's houses. To every person who lived in a house of less than £10 valuation, they put the gas in for 5s. 6d. a burner in their sitting-room or little front room, and a burner and a boiling-ring in the kitchen free of charge. The 5s. 6d. did not cover the cost. They put in a slot-cooker, which was a first-class one, costing about 50s., to any consumer who would use 8000 cubic feet of gas during the twelvemonth—this was for the cooker

alone. They sometimes burned as much as 13,000 to 15,000 cubic feet of gas, because they feared that if they did not do so, they would have to pay 4s. a year; and they were perfectly satisfied. They had 380 slot consumers at the end of their last financial year—the 31st of May. They averaged a consumption of 12,000 cubic feet through slot meters. This paid them very well. The population of the place was only about 5000; and they sold about 20 million cubic feet of gas; so the results went to show that, working with this class of consumer, the business paid well. Mr. Byron mentioned having a separate meter, so that he might get an exact record of the gas consumed for different purposes. He (Mr. Frizelle) did not use a separate meter. One meter was sufficient. Why a second meter should be put into a house of the description in question, he could not understand. It added materially to the cost. The way in which he counted the 8000 cubic feet a consumer used was this: He took the number of burners in the house, and averaged so many cubic feet for every point; and for the time they would be likely to be used. He did not proceed upon strict lines; he came and went with the people. If there was a complaint of any description with regard to the lighting, the cooker, the boiling-ring, or the meter, he sent at once to see to it, because if they kept a consumer without light or heat, they were losing every minute. As the result of all this, there was very little consumption of oil or candles in Holywood. He also paid every workman a commission for each new consumer he obtained—so much for a gas-cooker, and so much for a boiling ring; and this paid them also. He should explain that the 5s. 6d. was the fee they charged for fitting up the houses; the price of gas was 3s. 9d. per 1000 cubic feet to all consumers, for all purposes.

Mr. J. G. Tooms (Waterford) congratulated Mr. Byron upon bringing the subject before the meeting. It was a matter they could all very profitably consider and discuss. Mr. Byron pleaded for equality for slot consumers. His only excuse for joining in the discussion was that he had had experience of what he regarded as really strict equality for slot consumers. What he considered strict equality was treating slot consumers exactly the same as ordinary consumers, with the exception that the former used gas by prepaying for it. In Waterford, for some years they had 200 or 300 slot consumers; they had now something like 600, who had been treated identically with their ordinary consumers. If they had fittings for lighting, they paid for them; if they had a cooker, they either bought it or paid for the hire of it. He found some difficulty with this class of consumer, in setting the prepayment meters to exactly collect the proper amount per 1000 cubic feet of gas consumed. He also experienced some difficulty with a section of them in regard to the charges for the hire of cookers. The way they overcame these difficulties was by setting the meters slightly in advance of the ordinary price of gas, and refunding each year the amount overpaid. In all cases of slot consumers they gave a receipt for the money taken out of the meter, the same as for money paid on an ordinary account—on the quantity of gas shown on the indices, which were read quarterly. The consumption was worked out, and was charged for, at the ordinary rate; the amount of cash collected from the meter being credited, and if there were a surplus it was returned to the customer. He thought they would all agree that this was treating the slot consumer on a strict equality. He found in practice, however, that it was far from satisfactory, inasmuch as one consumer might have used gas very freely, consequently they would have to return 16s. or 18s. to him; but in the case of another consumer, who had used only a small quantity of gas, they might have to debit him with 3s. or 4s., in which case they made a practice of never debiting anything against a consumer. But it resulted in this, that one of the consumers would go to the gas office and want to know how it was that another had got 16s. or 18s. back, and she had got nothing. Any amount of explanation failed to convince some of these ladies that they had been treated at all as they deserved to be. Another thing they found, under this strict equality business with slot consumers, was that they certainly were not getting a certain amount of the business which they should have got. So, without abolishing their system of slot consumers being treated identically with ordinary consumers, they inaugurated another system of slot-meter consumption. This they called the slot installation business. He thought it would come under the heading of No. 2 in the paper. They had already obtained all the consumption which it was possible to get from ordinary slot consumers—and, by the way, he might remark that the ordinary meters changed over to slot meters were mostly among the poorer class, who certainly could not afford to pay for the hire of cookers. At that time their ordinary charge for gas was 4s. 3d. per 1000 cubic feet, with differential rates, and they fixed the price for slot consumers at 5s. They fitted up a cooker and three lights free; the three lights having incandescent burners. It was found, in connection with the first which were fixed, that the consumption of gas in the winter was a very negligeable quantity, and that the installations would certainly be unremunerative to the Company. After making inquiries, he found either the mantles were allowed to fall off, or the burners were not attended to. These consumers invariably declined to renew the mantles, and the burners were left dirty; so they decided, as an experiment, to give the slot installation, with all slot meters free. Since that time they had put in something like 500 more installations; and the last average he took of the consumption was 9000 cubic feet per consumer. The winter consumption was rather higher than the summer, due solely to the fact that their inspectors called upon each slot installation consumer, whether they were sent for or not, at regular intervals, and keep the lights in good order. They found it advantageous not to bother the consumer by asking him to sign an agreement that he would use 5000 cubic feet or any stated quantity of gas. His experience was that, when trying to get a consumer, if they told him he had to sign an agreement, he would be very chary of signing anything beyond the stereotyped application for a supply of gas on a particular system. They did not trouble the consumer to sign any agreement; and he considered that this had certainly been no mean factor in the success they attained in slot consumption. But, in order to protect themselves, each year he had a schedule made out of every consumer who had not taken £2 worth of gas. He then, with his slot inspector, went through the schedule, and marked off certain consumers who might have taken £5 or £10 worth of gas. These consumers were not cut off; they were simply informed that, owing to the small consumption for the preceding year, the service was unremunerative to the Gas Company, who would rather fix the stove and the meter to another consumer who would utilize them, and that unless they paid a meter-rent, as well as a cooker-rent, the installation would be removed. They served similar notices to all consumers. So that they had, practically, no idle capital, so far as meters and cookers were concerned, outstanding. Last year, out of about 1500 consumers, he had only to remove eight meters and installations; the others elected to pay 4s. or 8s., as the case might be, rather than let them take away the installation. He was afraid he had got away from a discussion on the paper; but he thought that, seeing he had had experience in treating such business (which he considered unique) on strict equality, his experience and opinions might be of some interest to the members of the Association.

Mr. R. Bruce Anderson (Westminster) joined with the others in thanking Mr. Byron for his most interesting paper, which was of a really useful class. The communication was, generally, a plea for equality. Mr. Byron had suggested one method, which he hardly approved of. He suggested making all consumers pay for their fittings, and then charging the same price. He thought equality was very desirable, but that they must treat ordinary consumers in the way in which many had been treating slot consumers, and give them free fittings. The system which he had had in use for a good many years now was to give slot consumers any fittings they liked up to the value of £6, including the slot meter and the cooker, conditional upon their using the cooker. He found that introducing these fittings to slot consumers free prevented their securing other small ordinary consumers. These were very reluctant to pay for £2 or £3 worth of gas-fittings in another man's house. It was really a matter of principle with them more than anything else. They did not like the idea of some people getting free fittings which they had no title to; and they did not like slot meters. What he would suggest was that they might supply a certain amount of fittings free of charge to ordinary consumers, and so put the whole of them on an equality; and he thought that in this direction there was scope for a good deal of development, which he had not managed to pick up by the slot meters.

The Hon. Secretary (Mr. J. Whimster, of Armagh) thanked Mr. Byron for coming forward freely and frankly, as he had done, with his paper. He agreed with those who had already spoken, that he had given them a thoroughly practical paper, on a subject in which every member had taken deep interest. He wondered that no more had joined in the discussion. He thought they would have been tumbling over each other to get a word in. As to the plea for equality to slot-meter consumers, from the experiences they had heard that day he did not think there was much need for the plea. Slot consumers seemed to be getting equality pretty well. So far as his own place was concerned, they were treated in precisely the same fashion as ordinary consumers. They gave them gas at the same price per 1000 cubic feet; they charged no meter-rents to anybody; and they supplied no free fittings, excepting that they occasionally put in a burner to stop a complaint and show that it was not the gas which was at fault, but simply the burners and fittings. Where they gave a slot cooker they charged a meter-rent, which was collected once a month—just when the cash-box was emptied. He could not tell them right off what the consumption per slot-meter consumer was; but it averaged somewhere about 12,000 cubic feet per annum. He had some 200 of them, over and above the ordinary consumers. Of course, there was this trouble with them, that occasionally people who did not require a slot meter, who were well able to pay, and whom they perfectly trusted, came and asked them to take away an ordinary meter and give them a slot one, so that they should not run an account. This became very troublesome. On the other hand, a slot meter was very convenient in dealing with the people from whom they could not get money. But he observed that if they got a prepayment meter, they burned more gas than they had done with an ordinary one—that was, taking the same class of people. It was not that ordinary meter consumers did not take the same quantity of gas, but the same class of consumer would burn more gas with a prepayment meter than if he had an ordinary one.

Mr. J. Richmond (Kilkenny) felt that the subject was one which he could do more justice to in a conversational way than in an argumentative discussion. It was a question which was interesting to the whole of them. What they were all trying to do was to develop their consumption. There were many difficulties in

the way of a few of the methods which had been enumerated. He had had some experience with one of them—the system of charging an excess price and returning the balance to the consumer; but, like Mr. Tooms, he had found it to be not very effective. He had also had experience of charging rent; but this was a system he never could enforce. People were apt to get cross, and ask them to take the whole thing away. There was no profit in taking it away, even though the consumption should be but a small one. He was adopting the No. 2 system in the paper—supplying all fittings and cookers, and charging all consumers an extra price indiscriminately. He found it very difficult to discriminate. Mr. Byron said it kept away the very small consumer. His experience was that they could not discriminate between who would be a good and who would be a bad consumer. He had had experience with houses where it might have been expected that they would be good consumers, with very bad results; and he had had experience in supplying houses which were really hovels, with first-rate results. Mr. Byron said they would require an extra fee of 7½d. per 1000 cubic feet, on a sale of 16,000 feet. He thought he was under a misapprehension as to the 10 per cent. He was going on the assumption that his usual price was the net cost price of the gas. Therefore, to get the interest he might be correct; but later on in his paper, he let them know that the slot installations he had already fixed brought down his manufacturing expenses by 3·03d. per 1000 cubic feet. This was an admission that the actual prime cost of gas into the holder must be only a matter of 2s. 6d.—or one-half of what his selling price was. Therefore, to get the price, as per the capital outlay, they must take into consideration what the prime cost of gas was, and the amount in excess of that would give them the profit.

Mr. J. PATERSON (Queenstown) also thanked Mr. Byron for bringing the matter before them; but he would not like it to go forth from the meeting that gas was a luxury to the smallest consumer. He made it a strong point to the small consumers that gas was equally cheap, if not cheaper, to them. If it were used in an incandescent burner, light for light he considered that it was just as cheap.

The PRESIDENT considered they had had a fairly gratifying discussion on this important question; and he was sure that some of the members must feel both surprised and gratified to find that the subject was receiving the attention it was, and with the very good results which Mr. Frizelle and Mr. Tooms had experienced. He was very pleased to hear that Mr. Frizelle had got something like 380 slot consumers. As he had said before, it was all a question of expediency. If they wanted to do anything for slot consumers, they were obliged to give them gas at a low price. This might seem unjust to the ordinary consumers, but, after all, they could not take the price to the ordinary consumers as the gauge. It was the profit on the prime cost they would have to take into consideration. Gas cost so much into the holder; and anything beyond that was gain to them. It was no injustice, he should say, to the ordinary consumers that they should supply slot consumers at even less.

Mr. BYRON thanked the gentlemen who had spoken for having given the meeting their experiences. He had not had the experience they had had—he had given them his own. Mr. Tooms had given him much more information than ever he had got before, for which he was exceedingly thankful. In Nenagh, their price was very high—6s. 8d. per 1000 cubic feet; and he found that, every year as they went on, it was the prepayment consumers who were coming to them. Their average was about 9000 cubic feet; and out of this they had to get about 2s. per 1000 feet for their debt. This was money they would not get but for the slot meters. He had considerably over 100 of them. His make of gas was increasing, and that it was so was due to the slot meters alone. He thanked the speakers for their kindness to him in what they had said.

Filtration Experiments at Washington.—A few months ago, some experiments in water purification were conducted by Major Spencer Cosby, of the Corps of Engineers, at Washington. According to "Engineering Record," three systems were employed: A, a rapid and a slow sand filter; B, a Maignen scrubber and a slow sand filter; C, a settling and coagulating basin and a slow sand filter. In a report recently made by Major Cosby, it is stated that no combination of filters has been found which satisfactorily clarified the Potomac water. He says that while the preliminary filters remove the greater part of the suspended matter, and leave comparatively very little work for the slow sand filters to do, the grains of mud remaining in the water after the first filtration are so exceedingly small that they are not entirely removed by either a second or third filtration. In order to arrest these fine grains, a layer of very finely powdered animal charcoal was applied to the surface of the slow sand filter of System B, but without any apparent success. The results from System C (the modified slow sand system) show, however, that it has so far been successful in keeping the water free at all times of turbidity by the occasional use of a coagulant and subsequent filtration. The experience thus far gained with this system indicates that it will be found to be the most practical method of clarifying the Potomac water at a reasonable cost, and at the same time utilizing the plant already installed. The bulk of the mud is not only removed by coagulation, but the small amount which remains is so changed in character that it can readily be removed by filtration.

ADVISABILITY OF INSTALLING A WATER-GAS PLANT IN SMALL GAS-WORKS.

By W. H. ROBERTS, of Newtownards.

[A Discussion introduced before the Irish Association of Gas Managers, Aug. 13.]

I am afraid the subject which I have ventured to introduce to-day will not receive the justice at my hands which it deserves, as it was only recently that I was requested to deal with it. However, I will endeavour, under this disadvantage, to bring forward as many useful points as possible for discussion, in the hope that my remarks will be supplemented by those who have had greater experience of water-gas plants than I can claim.

Let me say that I was led to think of the subject when certain improvements were contemplated in the Newtownards Gas-Works, of which I have charge; and, with a desire to attain greater economy of working, I began to compare the cost, utility, advantage, and disadvantage of a water-gas plant as against a coal-gas plant. Newtownards is a manufacturing town; and therefore we have a centre where there is a large day consumption. Not long ago, several of the manufacturers threatened to instal suction-gas plants; but we were able to meet them by a very substantial reduction—bringing the price down from 3s. to 2s. per 1000 cubic feet for trade purposes alone, according to amount used. The effect of this was not only to retain large consumers; but, in addition, a very large extra demand was created among manufacturers who had previously used steam and other means for power, &c.

Extension of the works, especially the gasholder capacity, has become necessary, seeing that my maximum output for 24 hours is actually double my storage capacity; but the consumption during lighting hours is exactly equal to the storage. This led me to believe that a water-gas plant would be useful in case of emergency. At the present time, I can work the retorts full and keep the supply going. This would be all very well but for the many little "supposes," which Mr. Shadbolt, of Grantham, referred to at the conference held two years ago at Dundalk. We are not prepared, in other words, for the unexpected; and I do not consider it is satisfactory to keep a spare bed of retorts to meet eventualities, which I find meantime to be the only alternative.

I believe it is generally found that, where a water-gas plant and a coal-gas plant are erected side by side, and worked up to their safe maximum, the cost is generally found to be slightly less than where coal gas is manufactured alone. My opinion is that, where coal gas-plant is capable of meeting the total demand, even with a water-gas plant at hand, it would not pay to work the latter save in emergency, for the following reasons: Much of the cost of coal gas consists of capital charges, depreciation, &c., arising, of course, from the original cost of the plant; and on the other hand, the cost of water-gas plant is comparatively slight. In coal gas the percentage chargeable on capital, depreciation, labour, &c., is greater than the cost of material; in water-gas, the reverse is the case. Therefore, to refer to the case of Newtownards again, seeing that the present coal-gas plant is capable of meeting all requirements, except in regard to holder space, and is likely to do so for a very long time, would it not be much more economical to incur the light capital charges of a water-gas plant, in order to be ready for any emergencies, than add storage to the present coal-gas plant? Even if the erection of a water-gas plant were the means of staving off the erection of a holder for only five years (assuming the cost of the holder to be £3500, and I find that a Dellwik water-gas plant could be erected for £700), in that time the saving effected in capital and interest would be equal to the amount spent on the water-gas plant.

A decided advantage on the side of a water-gas plant lies in the means it would afford for the using up of a surplus quantity of coke, which would otherwise have to be cleared off at a low price. When the price of coke is once dropped, there are difficulties in the way of raising it again. This is a very serious matter for a gas manager working under an urban council, because some of you are no doubt aware that "cheap coke for the poor" is a very popular election cry. There are always advocates of cheap coke on a council; and the price being once lowered, the manager will find himself strongly opposed if he attempts to raise it to the former figure again.

Another important point is the rapidity with which a water-gas plant can be brought into operation. Supposing an emergency occurs, and a shortage of coal gas becomes inevitable, a water-gas plant can be brought into requisition in the space of two hours. The water-gas plant I have mentioned would be capable of producing 150,000 cubic feet in 24 hours; and the difficulty should in this instance be surmounted. The old adage was that storage capacity must be measured by the maximum day's demand—this being based on the fact that it requires two or three days' heating of the retorts before the supply of gas can be augmented. But the circumstances are altered by the erection of a water-gas plant.

These are the points which have occured to me on the subject; and I place them before you in the hope that in the discussion to follow the expressions of opinion may prove useful to members of the Association, as well as to myself.

Discussion.

The PRESIDENT (Mr. T. J. Reid) thanked Mr. Roberts for coming forward at short notice and starting a discussion upon a

subject which he presumed every one of the members had had sometimes to consider—the way to make their holders go up. He was sure they would all be pleased to give expression to their views; and he hoped something tangible might result from the discussion.

Mr. G. Airth (Dundalk) said he had recently had the pleasure of meeting Mr. Roberts in Belfast, and they had then a little conversation on the subject he had brought forward. Of course, the advisability of installing water gas, or some other means of producing cheaper gas, had been the study of gas managers for many ages. At the present time, to be sure, they took much more interest in such a subject, considering they had all been hit to the tune of from 2s. 6d. to 4s. per ton for coal, and there did not seem much room for an increase in the return from residuals. Coke was sometimes so much of a nuisance that he would willingly spare a few tons of it to anyone. Tar, he thought, had reached its lowest ebb; it could not be much lower. When he had the honour of sitting in the chair of the Association, he spoke strongly of the methane-hydrogen plant. He still thought this plant met the necessities of the situation better than any other, because it used tar—not very much, he acknowledged, but still enough to enable them to get rid of some of it, and they would dispose of their surplus coke. The strike in Belfast had affected them to a very considerable extent. He had not been able to get any tar away; and if he had had a methane-hydrogen plant, he should have attempted to send out perhaps as high as 60 per cent. of methane gas. He had the pleasure, two or three years ago, of seeing the Truro plant for almost a week; and he was sure that if anyone went there, or to the larger plant which had been installed in the Great Western Railway Company's works at Swindon, two hours spent with it would amply repay him. It would likewise convince him of the possibility of benzolizing the gas, and mixing the methane-hydrogen gas and the coal gas thoroughly together. There was no shadow of a doubt as to the permanency of the benzole enrichment, either at Truro or at Swindon. The crude methane-hydrogen gas was enriched up to about 20-candle power before being mixed with the coal gas in the hydraulic main; and there could be no question as to the permanency of the enrichment, because after it went through the hydraulic main it had still to run the gauntlet of the foul main, the condensers, and so on. He thought no one could dispute that they were getting splendid results, when they were obtaining an enrichment value of 28 candles for each gallon of hydrocarbon they were using per 1000 cubic feet. In his opinion, this spoke well enough for it; and if he were asked to give his advice to Mr. Roberts, it would be changed slightly from what he gave him three weeks or a month previously. He thought the most economical way of applying the methane-hydrogen gas would be to use about one-third of it. It would be possible to employ it up to about 75 per cent.; but he believed the most economical way would be to use about 30 per cent. With this there would be, he thought, a saving of about 6d. per 1000 cubic feet—at least, there would be this saving as against the price of coal, taking it generally through Ireland at the present time. So that, if they used one-third of it in works making (say) 30 million cubic feet of gas a year, there would be a saving of about £500. Another thing was the saving effected by having their retorts always working up to the highest point they could; and in cases of emergency there was no necessity for any cutting down of pressure, as he had to do sometimes—and he supposed other people had to do it too. The plant could be got ready for work in less than two hours; and he did not think gas was likely to give out in that time. The last figure he got when he was in Truro—and they had obtained better results at Swindon—was that using 45 lbs. of coke, half-a-gallon of tar, and a third-of-a-gallon of benzol, and enriching the mixed gases up to 14 or 15 candle power, the cost was 8½d. per 1000 cubic feet. He was very pleased Mr. Roberts had brought the subject forward; and he hoped there would be a good expression of opinion as to what should be done, because it would assist some of them who might not be exactly in the same box, but who hoped to be.

Mr. J. G. Tooms (Waterford) thought that if they could get the view of someone else who had had actual experience of working a small carburetted water-gas plant, it would be of considerable value to the meeting. He merely rose to remark that anyone with whom he had ever been in conversation who had had practical experience with a small water-gas plant, invariably informed him that, though there were many what might be termed indefinable advantages in having such a plant at their hand, the cost was certainly considerably more than that of an up-to-date coal-gas plant. While this was so, they all knew that it was disputed by water-gas enthusiasts. If a paper were read about water gas, the sole object of the writer was to prove that he had not made a mistake in adopting it. He placed some value on the unbiassed actual experience of men who had had this plant installed; and he had never yet met a manager who had been sorry that he had adopted it, owing to the convenience it gave him in an emergency. But, invariably, he had been informed that, owing to the wear and tear of the engines, blowers, producer, and other parts of the apparatus, the cost in all cases had been much more than a coal-gas plant.

Mr. G. W. Anderson (Westminster) was in the position of having used water-gas plant in a small works about ten years ago. He was short of holder room, and he had all the advantages of a water-gas plant beautifully laid before him. He was told that, in case of emergency, he could turn on the gas, and that it was very much cheaper to make the same quantity with it than with coal-gas plant. Eventually he decided to put it up. The cost of the plant was considerably less than he would have had to pay for coal-gas plant. The cost of the gas, however, was a good deal more than that of coal-gas. He worked it a considerable time, and got to the ordinary ratio, more or less. He used about 3 gallons of oil per 1000 cubic feet of gas. The cost was more; but the difficulty he found—and he thought a good many people found, although they did not hear about it—was the question of mixing the gases. If they had not much gasholder room, they had to make all their water gas in the evening, and send it all out in the evening. But their average being from 20 to 25 per cent., they might, in the course of one half hour, be sending out 60 or 70 per cent., according to their gasholder accommodation. The percentage might vary very much during the hours of the evening. There were no inverted burners in those days, and very little incandescent lighting; but the effect upon gas-fires in the neighbourhood was very striking. These fires were adjusted for ordinary coal gas, and as long as they sent out this the result was satisfactory; but when they distributed a varying mixture of water gas and coal gas, the result was not satisfactory. They were told it was a splendid plant, and that when they were short they could make gas very quickly with it. There was no doubt about this. It was a grand apparatus. When they had a strike among the workmen they could rush the plant forward and give the consumers gas—of a kind, but still it kept the lights going. The question of cost resolved itself absolutely into what they paid for materials, and what they got for their coke. A little while ago he was in Buenos Ayres; and after a great amount of consideration, a water-gas plant was put up there. One of the great difficulties they had was the disposal of surplus coke. The plant was put up at a time when they had no coke; the surplus had all disappeared. High freights had made coal so dear that all the coke went away. He had to start the water-gas plant without any surplus stock of coke. He was buying coal in the works at 25s. per ton; and he had to pay £6 per ton for oil—roughly speaking, about 6d. per gallon. He thought that if they took these figures, they would find that it was not a very paying thing to use water gas. However, under the instruction of his Directors, the plant was started; and they worked away with it. They worked so well that they had to refuse to sell coke in order to keep the plant going. This, of course, was not business; but it had to be done under the special circumstances. The difficulty was so great that he had to go the length of buying Cardiff steam coal at 30s. per ton—using it in the retort-benches, so that he should have more surplus coke to employ in the water-gas plant. He was able to sell the coke from the retorts at £2 2s. per ton. There was another difficulty, in regard to the difference of pressure. Of course, the difference in the density of the gas came into consideration the same as in England. His wife was a very good critic. She did not know when they were making coal gas or water gas; but she used to watch the gas, and she would complain on the nights they had water gas. There was no doubt about it that she knew, from the lights in the house, when they were using water gas and when they were using coal gas. The incandescent burners showed it very clearly. The question of the regular quality of gas was, he thought, a thing which had to be more seriously considered than it had been recently. They had heard a great deal about the regular pressure of gas; but it was the regular quality they should attend to. They should give a regular quality of gas as well as a regular pressure; and he contended that, if they were short of gasholder accommodation, they could not give a regular quality of gas from hour to hour during the day. If their gasholder accommodation were ample for the ordinary day consumption, they might use water gas, provided the cost of material would enable them to do so. Mr. Roberts stated that, while working at a safe maximum with coal and water gas plant, they could make the gas cheaper than with coal-gas plant alone. But if they were working both at the maximum, they had no reserve; and therefore they must have more gasholder room to put the extra gas into. If they had gasholder room sufficient, then they could work the plants hour per hour, and get the gases mixed properly and give satisfaction to consumers; but so long as they had to depend upon water-gas plant for rushing a large quantity of gas through to consumers, he did not think they would be able to give satisfaction.

Mr. D. W. Tooms (Fermoy) considered that the system was one of great possibilities. In his works, the retorts were worked at their maximum in the winter; and it struck him that, as they eased off, the slack could be worked off with water-gas plant. They often had a bed working at half its capacity; and the carbonizing could not be nearly so good as when at its full capacity. There was a possibility that the water-gas plant could be worked profitably to take up the slack.

Mr. T. Frizelle (Holywood) said the difficulty was that of filling the holders. He went into the question of water gas some years ago. One of his Directors was a water-gas man. This was at the time when Mr. Sampson Fox was telling people that they could get gas at 6d. per 1000 cubic feet. There had been a great change in the size of the plants, and the manner of manufacturing this gas, compared with the first that were put on the market. The cost was then something prohibitive. In this matter, a good deal depended upon the requirements of the town. In his place, the consumers were all private ones. There were no public works; therefore they had a regular consumption, practically all through

the day and night. Mr. Roberts's case was different. So far as he could understand, at Newtownards they were practically idle from Friday to Monday, when a lot of retorts were lying off. So it resolved itself into a question of the requirements of other works. If they could do with the varying quality of the gas, it was all right. He could not do with this at all. If his gas dropped in illuminating power, he had letters from consumers next morning. He had to keep it as regular as possible—to take as much gas out of the coal as he could, but to give illuminating power.

Mr. R. Bruce Anderson (Westminster) said they were often told that, if they put up water-gas plant, they would command the coke market. This, he was afraid, was a fallacy, as he found that the price of coke in their markets was regulated a great deal more by the cost of importation than by the amount of coke they actually had to dispose of themselves. If they used a considerable quantity of their coke to make water gas, and so reduced the amount of coke they had to sell below the requirements of the neighbourhood, they could not raise the price of it, because, if they did, they would immediately have coke imported. In Mr. Roberts's case, the use of the Dellwik plant would be very much restricted, owing to the small proportion of blue gas he could introduce into his make. Another question was the short time during which the plant might be worked. It might be three hours, or up to seven or eight hours. They would have the same outlays whether they had a two or an eight hour run; and the quantity of coke required to fire up, and to let down, would be the same. This materially increased the cost of the gas; the cost being usually based, to them, upon long runs. The size of the works, in his opinion, was the controlling factor in the argument. In a large works, where there was ample storage, they could run the plant regularly, and in this way take advantage of all the economies that were attendant upon water gas; but in a small works, he was afraid they would find it of very little advantage.

Mr. Roberts, in replying, said that Mr. Airth had remarked about the price of methane-hydrogen gas being 8½d. per 1000 cubic feet. He had got the price about 1s.; and he reckoned that, with coal gas, the cost of handling, after deducting residuals, would be about 8½d. per 1000 cubic feet into the holder. This was really why he came to the conclusion that it would never pay to introduce water gas anywhere, unless it were absolutely necessary. The only thing that gave him an impression favourable to the putting down of a water-gas plant was the actual cost of the apparatus. The difference in the density of the gas had been remarked upon. He was considering that, if he put in the Dellwik plant, he would require a benzol plant along with it. He thought that the presence of the benzol would materially alter the density of the gas, so that the difference would not be found at the burners. Speaking from last year's experience, there were just three times during the whole season when he would really have given something to have had a water-gas plant standing beside him. This was a position he would like to remain in; for, if he required to use it frequently, it would be better to put up a holder, and not use water gas at all. Considering the cost, the only thing he felt in regard to water gas was that he would save (as he mentioned in his paper) the total cost of the water-gas plant in five years, in capital—that was to say, if they were able to run without extra storage. Then they would have the water-gas plant beside them, without further charge. This was really the position he was placed in. It worked out as a mere matter of cost; and as Mr. Frizelle, who knew the circumstances he was working under, remarked, he would put out 150,000 cubic feet per day from Monday to Friday, and he would drop down to 60,000 cubic feet per day from Friday to Monday. He thanked them for the kind manner in which they had received his paper.

River Pollution in the States.—A river pollution decision was recently given by the Massachusetts Supreme Judicial Court, in the case of *Parker v. The American Woollen Company*, to which attention is called by "Engineering Record." The Court has decided that there is no question about the right of each riparian owner to use the stream in a reasonable manner, according to the usages and wants of the community, which will not interfere with a similar use by the riparian owners above and below him. Many of the uses which properly may be made of the water of a natural stream by an upper riparian owner will have some tendency to defile the water, and it is inevitable for controversy to arise concerning what is permissible contamination. The Court rules that no riparian owner has the right to use the waters of a natural stream for such purposes or in such a way as will materially injure it for the use of a lower riparian owner, or to add to it substances which will make it unfit for use. Owing to the self-purification which takes place in streams, the law will not prevent the discharge of every small amount of polluting substance into the water, though this may be prevented by statute. The Court also makes the important ruling that the plaintiff is entitled to an injunction restraining the pollution of the stream, even though the pollution does not now interfere with any use he is making of its waters. The Court accordingly ordered a decree to be entered enjoining the defendant from emptying or discharging, or permitting to be emptied or discharged, into the brook above the plaintiff's premises any objectionable substances whatever, in quantities that would appreciably affect the purity of the waters when they reached the plaintiff's premises, or render them materially less fit for drinking, domestic, or other uses at that point than they were when they entered the defendant's premises.

SOUTH-EAST OF IRELAND GAS ASSOCIATION.

Quarterly Meeting at Wicklow.

The Quarterly Meeting of the South-East of Ireland Gas Association was held at Wicklow last Thursday—Mr. D. W. Tooms, of Fermoy (the Vice-President), in the chair. The members were accompanied by a number of lady friends, and some invited guests were also present. After going through the gas-works, and inspecting the alterations which are being made (described in the paper by Mr. G. W. Anderson given below), the visitors were hospitably entertained by the Wicklow Gas Company. Mr. J. F. Tyndall, the Resident Manager of the Company, presided.

At the close of the repast, Mr. D. W. Tooms said that, in the absence of the President of the Association (Mr. G. Lennon, of Dungarvan), the duty devolved upon him, as Vice-President, to propose a vote of thanks to the Wicklow Gas Company for their kind welcome and generous hospitality. Referring to the way in which the Company were reconstructing their works, he said a great deal of credit for this was due to Mr. Tyndall, as well as to Mr. Anderson, the Engineer of the Company. Mr. Tyndall, in responding, said it was a pleasure to the Company to entertain the visitors; and he only hoped that in visiting their works they would have seen something interesting and of profit to them in the reconstructions they were carrying out. Mr. Tooms proposed the health of the guests not members of the Association; and the toast was duly honoured and acknowledged.

Mr. G. W. Anderson then read the following paper, descriptive of the

EXTENSIONS AT THE WICKLOW GAS-WORKS.

The management of the Wicklow Gas Company, Limited, was placed in the hands of Messrs. Anderson Bros. (of which firm I am a member) early in March of this year. We found the works very congested, and in a somewhat dilapidated condition. There were three ovens containing in all ten retorts direct-fired in a small building and an annexe thereto, a fair-sized pipe condenser, 2 ft. by 6 ft. square purifiers, station meter (out of order and out of use), and two gasholders totalling about 20,000 cubic feet capacity, and a 6-inch governor for regulating the town pressure. As the gasholders were back-balanced and gave 2½ inches pressure, the governor was hardly necessary. There was no exhauster, washer, or scrubber. There were two coal-stores, each at some distance from the retort-house; necessitating, from their position, the occupation of much yard space in order to give access to them when receiving coal. There was a small house for the Manager, and a small workshop for the town fitters. On the district there were 137 ordinary and 34 slot consumers, 3 gas-cookers, 113 public lamps, and 3¾ miles of mains, from 6-inch downwards.

Prior to commencing operations to put the works into more modern order, we had to decide upon what scale they should be reconstructed. During the last winter the maximum consumption was about 30,000 cubic feet per day. Wicklow is a seaport, and a summer resort for Dublin holiday makers. We had very few data as to what the daily consumption in summer was. There had been little or no attempt to push the sale of gas by means of slot installations or gas-cookers. Eventually it was decided to reconstruct the works on a scale of 120,000 cubic feet of gas per day. The area of the works being one-fifth of an acre, there was not much room to play with. It was decided to pull down the old retort-house, the walls being in a somewhat ruinous condition, and to build a larger house, taking in the site of the old purifiers and the yard space between the old retort-house and a steel gasholder tank; to pull down and rebuild the retort-ovens with regenerative firing; supply and erect a water-cooled condenser; and provide an engine, exhauster, and washer; double the area of the purifiers, supply a scrubber and a new station meter, and rearrange the position of the governor. In order that all the apparatus requiring occasional or frequent attention should be at a spot convenient to the stoker on duty, it was decided to have the engine and exhauster, station meter, and governor all in one building close to the retort-house. Yard space being scarce, the scrubber was arranged to be placed over the engine-room. It being considered that the existing gasholder storage was already too small, the various portions of apparatus have been so arranged that it will be possible to erect a holder of 78,000 cubic feet capacity upon the site without disturbing any of the work now being executed.

At about the end of March, Mr. Tyndall, the Resident Manager, took up his duties. His first work was to reinstate the station meter, which he had had repaired by the makers. He has thereby been able to get a proper record of working almost from the date he entered upon the works. The house upon the works occupied by the late Manager was partly pulled down, so as to obtain some yard space for coke, and the remaining portion was arranged for stores and the Manager's office. No attempt has yet been made to give the Manager a house upon the works; but it is intended later on to demolish the buildings near the entrance, and erect suitable workshops and a Manager's house. The result of this propaganda so far has been very decided. We had on July 31: Ordinary consumers, 130; slot consumers, 103; length of mains, 4 miles; cookers in use, 96; public lamps, 113. On comparing this with the numbers on the 30th of March there will be noticed a reduction of seven ordinary consumers, some of these having

been transferred to slot cooker installations. There is an increase of 69 slot consumers and 93 cookers, while only a quarter of a mile of main has been required to get these extra customers.

Matters being sufficiently advanced, gas making was concentrated on a bed of three retorts in the annexe to the retort-house. This necessitated disconnecting the hydraulic main in the other two beds, and the building of a small chimney; the old one having to be pulled down, the roof removed, and as much of the retort-house walls as could be spared taken down. The new purifier (about 10 feet square) was erected in its permanent position in the corner of one of the old coal-stores, and connected to the condenser temporarily with a 2-inch barrel pipe. The old purifiers and connections were then cleared out of the way, and the foundations for the retort-bench and the retort-house proceeded with. For the new retort-setting, it was decided to provide two ovens—one for five retorts, 15 in. by 8 ft. 6 in. long, and one for nine with regenerators, and with producers alongside the ovens so arranged that either producer can fire one or both benches. The first brick for the retort-benches was laid on Friday, June 21, and the bed of five retorts was put under a drying fire on Wednesday, July 30, and gaseous firing commenced on Tuesday, Aug. 6.

Their principal energies had been concentrated on getting this bench ready for work, while at the same time preparation for, and erection of, the general apparatus was proceeded with. Walls for the new coal-store and retort-house have been built. A coal-store capable of holding 250 tons has been arranged immediately in front of the retort-benches, and into this coal can be carted direct. Wicklow being a seaport, it is not necessary to keep more than six weeks' stock of coal, which at the present winter output can be placed down in front of benches. The summer has been a very broken one. You will understand, therefore, that it has been a somewhat anxious race against time to get the retorts ready before the lamplighting season sets in. We had no roofs, and all the brickwork had to be constructed in the open air. The anxiety was increased by absence of data as to what really had been the consumption in the former summer seasons, and what it would be on account of the increase in the consumers.

It may be thought that it was injudicious to take on so many new consumers before the new works were ready; but we took the risk of this rather than lose probably twelve months' consumption from new consumers. The result shows we were justified, as we have not had a moment's cessation of supply, and have kept more pressure upon the town during the period of alterations than had formerly been the practice. Under the circumstances, the retort-bench had to be put under fire much sooner than is advisable. There had been no time to allow the brickwork to dry atmospherically. By careful attention to slow firing, however, no mischief has been done; the retorts having been charged very lightly at first. Except the boundary walls, two gasholders, and the old coal-store, everything on the works is new. The old retorts were large—22 in. by 15 in. diameter. As I do not approve of this shape for small works, 15-inch rounds have been substituted. The ascension-pipes are 5-inch. A separate hydraulic main is provided for each bench; the mains being carried by the buckstays, and not from the brickwork of the ovens. A 6-inch foul main runs round the coal-store, and is provided at all corners with suitable clearing flanges. The condenser is a vertical tubular water condenser for 60,000 cubic feet, arranged with reversible connections (on the system originated by Mr. Browne, of Vauxhall). Space has been left to erect an additional condenser when required. The exhauster is for 5000 cubic feet per hour, with a 3 H.P. Crossley gas-engine to drive it and the scrubber. The washer is of the Livesey type, and the scrubber a Clapham "Eclipse." Two old purifiers were utilized by joining them by open pipes, so that they form one vessel. The new purifier, 10 feet square, is of the luteless type, and has a corner taken off it to allow room for the proposed gasholder tank, which will probably be constructed next spring. A second-hand station meter (purchased from a neighbouring gas company) has been installed near to the exhauster-engine, and the old town governor removed and refixed near to the station meter. All the underground pipes on the works have been rearranged and relaid, and in due time the yard will be paved, so that the Manager may have a clean place for his men to work in.

I think Mr. Tyndall is to be congratulated on the amount of work he has been able to get through, while at the same time keeping the works going and adding so largely to the number of consumers. He was ably assisted by Mr. Richmond, whom we sent over from Kilkenny, and who remained on the works looking after the reconstruction until we saw clearly that the security of continuity of gas supply was reasonably assured, and while Mr. Tyndall was attending to district work. We felt it most desirable that there should be a thoroughly competent man on the alterations during all the working hours, so as to give the Manager time to attend to the town's wants. The work generally has been carried out by local men; the only contractor's man being the fitter to erect the scrubber. Though not finished, the work is sufficiently advanced to enable you to see the general outline of our plans. You will have noticed that the architecture is of no particular period, much to the disgust, I am afraid, of the Resident Manager. We had, however, to utilize as much of the old material as possible. The retort-benches are free to move independently of the retort-house walls, and are not being connected with them except at the back. The condenser is set on joist irons about 8 feet above the ground level. This is to enable the tar to be sent by gravity to tanks over ground, from which the barrels into which it is loaded will be filled without any pumping. The scrubber being overhead enables the outflowing liquor to go direct through the washer also without pumping. So far as Mr. Tyndall can do so, the balance-weights will be removed from the gasholders, in order that more pressure may be given to the town when desired. The roof of the retort-house is of the well-known Irish truss wooden kind, covered with felting; and part of the new coal-store is covered by roofing removed from the old retort-house.

As to the cost, the work not yet being concluded, I am not at present in a position to say how much these alterations will cost, but I think something under £1500. We expect that by the end of September the alterations will be completed, and that the Manager may have a quite time for relaxation to make up the cost preparatory to his facing his first winter season in Wicklow.

Discussion.

The CHAIRMAN, in opening the discussion, remarked that the paper was an excellent one, and contained a good deal of information.

Mr. J. G. TOOMS (Waterford) said that during the reading of the paper the point that struck him first was the value of station-meter records, and it would be noticed that the first thing that had been done at the Wicklow works was to put the station meter into thorough order. The next thing, the enormous increase in cookers and in slot meter consumers. This showed, where the means for extension were available, what could be done immediately, without much waste of time in sowing the seed. He thought he was correct in stating that within three months of the works coming under new management the gross number of consumers increased by something like 60 per cent., cookers from 3 to 96, and slot meters by 34 to 69, while ordinary meters decreased by 7. In so short a time, this alone constituted a record for any works, either in Ireland or on the other side of the Channel. It reflected very great credit indeed on his friend Mr. Tyndall. In the scheme of alterations, new purifiers had to be bought and placed in position. The building of new settings from the foundation and the firing of them after 37 days was a record for any works. He was in agreement, after considerable experience, with the reader of the paper as to the advantage of round retorts over the oval or the Ω shape. He considered some of the relatively best results he had ever had were obtained from 15-inch round retorts. He should like to ask the author of the paper if he had made any estimate as to whether or not there was a saving in carrying out all the extensions by means of local labour under efficient supervision, as against letting the work out under contract to the usual gas-works contractors. He thought this would be valuable information to have. With regard to the wood roofing of retort-houses, which had been referred to in the paper, he had seven years' experience of such roofs, and found them eminently satisfactory in every respect. It afforded him a great deal of pleasure to congratulate Mr. Tyndall on the manner in which he had interpreted the plans of the Engineer, and the successful way in which he had carried out the alterations.

Mr. T. HORNBY (Mallow), referring to Mr. Anderson's remarks about retorts, said he preferred oval to round ones; but he should like to know Mr. Anderson's reason for stating that the latter were the best.

Mr. R. BRUCE ANDERSON (London) said before the management decided upon the alterations it occurred to them to see what grounds were available beside the works, in order that they might acquire them for the purposes of their extension scheme. There were two plots of land which would have suited their purpose admirably; but circumstances prevented their acquisition, and so they had to adopt the plan of alterations described. He had to draw their attention to the fact that while these were in progress the supply of gas to the town had to be maintained; so that they had not an opportunity of having a clean sweep of plant, but had to keep some of the old plant in position till they would get the new at work. It was almost impossible to tell how long it would occupy in getting the work done. By doing it themselves, however, they could economize very much; whereas if they had a contractor to deal with, and he was kept waiting and had no other job on which to employ his men, he would have to put on an enormous bill of extras so as to make a profit.

Mr. T. P. NEWBOLD (the Secretary of the old Gas Company), said, with regard to the alterations, he knew there was necessity for them; but the only difference between himself and Mr. Anderson was that he (Mr. Newbold) did not know how to effect them. He had been for years thinking daily and nightly how the alterations could be made; but he never found the solution till he saw Mr. Anderson's plans, which were a marvel to him. He hoped Messrs. Anderson and Mr. Tyndall would meet with the success they deserved for the employment they had given in Wicklow, the extension they had made in the gas-works, and the general improvement effected in the public and private lighting.

Mr. TYNDALL said it was his whole heart's desire to interpret Mr. Anderson's plans to the best advantage; and he hoped when the works were finished he would find satisfaction from them.

Mr. G. W. NORMAN (Dublin), referring to the retorts, said he did not know what Mr. Anderson's object was in putting in small round retorts, as he (the speaker) always thought that the Ω retort—so like a flat-bottomed kettle—gave a better heat, that the round one was best for clearing out the coke, and that the oval

was the happy medium. With regard to the carrying out of the work, he thought the new departure adopted was a very good one because it was giving employment to the people in the town from which they derived their profit.

Mr. J. PATERSON (Queenstown) thought it was very creditable to be able to erect works with an ultimate output of about 20 million cubic feet on one-fifth of an acre of land. He was very much struck with the great increase in the consumers and also in the number of cookers. With regard to the installation of round retorts, he quite agreed that they were the best for either small or large works. His opinion was that they got more gas from a ton of coal by them; they were also much easier to stoke, and were more easily drawn. ⌂ retorts made very poor coke, and were much harder to draw.

Mr. T. Frizelle (Holywood), the President of the Irish Association of Gas Managers, remarked that what appealed to him forcibly was the short time in which the alterations had been carried out. He did not believe in hanging over a job. He was continually putting it into his men that when anything was to be done it must be done as quick as they could do it. The Wicklow Company were to be congratulated on their Manager, who within six months had increased the number of consumers by 62, laid a quarter-of-a-mile of main, and put in 96 cookers, in addition to giving his available aid in the reconstruction of the works. He (Mr. Frizelle) expected a good deal from Mr. Tyndall, and he had realized his expectations.

Mr. B. MITCHELL (Bangor) also referred to the progress made.

The CHAIRMAN said, taking into account the state the works were in six months ago, the progress made was something near the marvellous; and, in addition, they had kept up the supply of gas in the town without any hitch whatever. Most of them had had a good deal of experience in reconstruction; but he did not know of any works since his connection with Messrs. Anderson that had made such a sweep as had been done at Wicklow.

Mr. G. W. ANDERSON, answering Mr. Tooms as to the saving effected by employing local labour as against contractors, said he had not made any estimate. He had been accustomed all his life to doing his own work, and he did not see why they should not do the same in Wicklow. A very important feature in it, to his mind, was that it gave the Manager scope, and enabled them to see what sort of a man he was. Where they could, they should always get work done locally. With regard to the round retorts, he preferred them in small works where they had no machinery to work them; but in large works he preferred the oval or ⌂. The round retort was easier to draw, made much better coke, and very little breeze. Referring to the commercial side of the business, when the works were taken over from the old Company, he had no fault whatever to find. Mr. Newbold had his books and everything in connection with the consumers in most perfect order. He was most useful to them; and they were extremely grateful to him for the assistance he had given them. In conclusion, he said they had spent in wages from £30 to £35 a week for the last four months; and the Wicklow men had done their work well.

A general discussion then took place, after which a vote of thanks was passed to the Chairman, and the proceedings terminated.

Test of a Crossley Gas-Engine.

A report has lately been published on the result of some trials carried out by Dr. J. T. Nicolson, of the Manchester University, of a gas-engine made by Crossley Bros., Limited. The tests were undertaken with the object of measuring the brake-horse-power of the engine, and gauging the gas consumption per hour. Observations were also made on the speed variation of the engine between full and light load, so as to test the new system of governing introduced by Messrs. Crossley, which acts by varying the timing of the first admission of the gas while always cutting off at the end of the stroke. The gas used was made from bituminous slack coal in a Crossley producer plant; and its calorific value, on analysis, was 156·5 B.Th.U. per cubic foot. Tested by a Junkers calorimeter, the value obtained was 149 B.Th.U. per cubic foot, at the temperature and pressure of the instrument. The volume of the gas used by the engine per hour was 31,368 cubic feet, at 20° C. and a pressure of 2½ inches of water. This equals 29,037 cubic feet of gas at 0° C. (32° Fahr.) and 760 mm. of mercury. The barometer readings were 30·21 inches. The brake-horse-power worked out to 559. The gas used by the engine per hour at 32° Fahr. and 29·92 inches of mercury was therefore 51·94 cubic feet. Hence the heat supplied was $51{\cdot}94 \times 156\frac{1}{2} = 8128$ B.Th.U. per brake-horse-power-hour. The thermal efficiency was accordingly $2546 \div 8128 = 0{\cdot}3132$, or 31·32 per cent. This result is declared to be highly satisfactory. The engine was found to vary in speed from 119·4 to 121·4 revolutions per minute when the horse power was instantaneously dropped from about 600 to 50. This represents a total variation of 1¾ per cent. of the mean speed. The full load was then thrown on again as quickly as possible; the same process being repeated again and again. It is said the speed never varied more than the percentage mentioned above.

The death is announced, as having taken place on the 8th inst., of the wife of Mr. A. C. Fraser, at present of Salford, but formerly Gas Engineer at Bolton, Loughborough, Neasden, &c. Mrs. Fraser, who was 67 years of age, died after an illness of nearly five years' duration.

RECENT PROGRESS IN THE GAS INDUSTRY.

An Interesting Address by Herr Blum.

At the last meeting of the Austro-Hungarian Association of Gas and Water Engineers, held in Vienna on May 31 and June 1, a paper was read by Herr E. Blum, of Berlin, entitled "A Review of Recent Progress in the Gas Industry." From the text of the paper, published in "Gastechniker," we get the following particulars of the speaker's remarks.

After referring briefly to the great improvements that had been effected during the past ten years or so in the methods for the consumption of gas, chiefly through the discoveries of Baron Auer von Welsbach, which had led to the possibility of obtaining 1-candle power of light for every litre of gas burnt, Herr Blum expressed the opinion that the gas industry had progressed at least as rapidly as the electrical industry, and that, though great hopes were based by the electricians on the new metallic filament lamps brought out a short time ago, there was little reason to think that further advances would not be made in the manufacture and consumption of coal gas which should enable the industry to hold its own as successfully as it had done in times gone by.

Two great problems confronted the gas engineer of to-day. Firstly, to discover cheap and efficient methods of moving large quantities of material into the desired places; secondly, to seek economy in the actual manufacture of gas. For several years past the price of coal had risen, and it would probably continue to do so. Rates and taxes had increased, wages had grown, yet the price at which gas was sold had fallen. In view of the competition with electricity, in view of the increasing demands of the public for light, and the severity of modern existence, it was necessary that the price of gas should continue to fall; and to enable it to do so the engineer must secure the utmost economy in his manufacturing charges, and must reduce to the lowest point possible the amount of manual labour employed. Referring more particularly to the question of labour, Herr Blum discussed the introduction of machinery on a gas-works, urging the great desirability of employing men for their intelligence rather than for the muscle they possessed. The more that men were studied by relieving them of exhausting physical labour, and the more their capacity was increased by providing them with machinery, the higher the wages they could profitably be paid, and the fewer would be the difficulties of a Socialistic character with which the engineer would have to cope.

On the lines he had already laid down, the author regarded as of the utmost importance to the gas industry the changes that had already come, and were now gradually coming, over the nature of the vessels in which coal was converted into gas. The old-fashioned horizontal retort must be charged and discharged by shovel, scoop, or machine; the inclined retort was its superior, inasmuch as the force of gravitation was made to do much of the work; while the vertical retort was better still, for gravitation was employed to the maximum degree possible, the number of stokers necessary was largely reduced, and their labour—more particularly the severity of their labour—was minimized. Furthermore, the introduction of carbonizing vessels larger in size than the conventional retort was advantageous, inasmuch as the carbonizing periods were lengthened. The carbonizing period of twelve hours, which was gradually being adopted, had manifold advantages. It enabled shifts of twelve hours instead of four hours to be worked, and might well lead to a great reduction in the amount of work necessarily done during the night. In other directions, too, the vertical retort was superior to the horizontal; for it was charged to complete fullness, and was worked off at a higher temperature than its predecessor. The higher temperature was permissible because as the retort was quite full of coal, a layer of coke was first formed at its periphery, so that the interior actually remained at a comparatively low temperature, and the coal therefore yielded a thinner tar, together with a larger output of ammonia. An increase of 60 to 70 per cent. in the yield of ammonia was a very important consideration at the present time. It was necessary to remember that the great advantage that a gas-works possessed, in comparison with an electricity generating station, was that the former did not destroy the whole of the fuel, but enabled the bye-products to be recovered which to a large extent paid back the expense of purchasing the raw material. The use of vertical retorts not only augmented the make of ammonia, but gave a gas free from naphthalene—a substance that might be deemed the chief thorn in the flesh of the gas engineer. In large towns it often happened that hundreds of naphthalene stoppages had to be attended to per day, blocking consumers' connections and the public lamps. The possibility of avoiding this trouble opened a happy vista to the gas maker.

Herr Blum went on to discuss the merits of the large carbonizing vessels employed at Munich,* where the coal was heated in chambers something like horizontal coke-ovens, but provided with sloping bottoms whereby the coal distributed itself uniformly, and the coke afterwards fell out under the influence of gravitation. The general carbonizing operation went on in a very similar manner to that in the vertical retort, though certain differences

* An abstract translation of a paper dealing with these chambers, communicated by Herr Ries to the German Gas Association, appeared in our issue for Aug. 13, p. 438.

prevailed. The Munich ovens were recharged every twenty-four hours, and were so large that there was practically nothing to do during the night. There were 150 of these ovens already in use or in process of erection; and the speaker believed that they had a great future before them. Dealing with other matters, the author spoke of the modern arrangements for coke handling, for which purpose the De Brouwer conveyor was so valuable an appliance. It was difficult to overestimate the advantages of a system where the coke fell automatically out of the retorts and was taken into store by purely mechanical means.

Great advances had been made in the direction of purification and the treatment of bye-products. The complete removal of ammonia and of naphthalene from the gas followed largely upon the use of vertical retorts; but improvements had also been made in reducing the speed at which gas passed through the purifiers and in subdividing it more perfectly. Years ago the ammonia recovered on a gas-works was stored as liquor and sold as such. Now it was almost invariably converted into ammonium sulphate, liquid ammonia, or ammonium chloride. Hence the great underground liquor tanks used twenty years ago had largely disappeared, for the store now kept was only sufficient to last an ammonia plant for two or three days. Similarly with tar; for it was usually distilled and stored in the form of finished products. Uncontrollable losses of ammonia and tar occurred from the old subterranean tanks. Now the small quantities which had to be kept were stored in tanks above ground, where every leakage could be instantly detected and where the tar would settle so well as to be practically anhydrous; while evaporation of the ammonia was no longer possible. On the whole, it might be said that, through the introduction of machinery, through improvements in carbonizing vessels, and through careful recovery of the bye-products the gas could be made for about "10 heller per cubic metre" [about 2s. 4d. per 1000 cubic feet] less than in the early days of the industry. Indeed, the improvements that had been introduced in the new gas-works at Nuremberg had lowered the cost of making gas by about 0·8 pf. per cubic metre [2·8d. per 1000 cubic feet] from what it was in the older works.

Herr Blum proceeded to express the opinion that, with certain exceptions, the scientific and engineering problems involved in the design and construction of plant were not studied so thoroughly by gas-makers as was the case among electricians when erecting a new generating station—even methods for popularizing the use of gas and stimulating its sale were not made the most of. In some German cities women were engaged to go among the consumers and teach the best methods of employing the gas-cooker, meeting with far greater success than men. Indeed, in the Munich Gas-Works classes for gas cooking were held which were attended by large numbers of girls. The author also remarked on the necessity for seeing that the pressure was sufficient in all parts of the district served by a gas undertaking, and that consumers' mantles were changed with proper frequency. Gas incontestibly gave a better light than electricity—one which properly illuminated a room and did not harm the eyes by exposing them to the extreme brilliancy of a glowing electric filament. On the other hand, the manner in which the electric light could be turned on and off was a great point in its favour; and if something strictly analogous to the switch could be devised for application to gas, great advances would rapidly be made.

Herr Blum brought his paper to a conclusion by describing an appliance he used with great satisfaction in his own residence. He had installed an apparatus of the usual kind for increasing the pressure of his gas, and had also fitted every pendant with a small tube running to a convenient place, where it terminated in a rubber ball which could be compressed by a switch. The balls and the tubes contained gas under pressure; while each pendant was fitted with a special valve so that the extra pressure communicated to one particular pendant did not affect the others. The switches were situated in numerous parts of the house—in the entrance hall and in the upper landings, for instance, so that lights could be turned up or down from almost any place. The author considered that the only remaining disadvantage of gas was the heat it evolved on combustion. While this was very pleasant in the winter, it was inconvenient in the summer; and he hoped that improvements in existing systems of domestic ventilation would soon be devised which should remove this solitary defect.

Monazite Production in the Past Year.—In the current issue of the "Journal of the Society of Chemical Industry," some statistics are quoted from the United States Geological Survey in regard to the production of monazite last year—all from North and South Carolina. It is stated that the grade of the sand was so variable, and the prices realized on different lots were so irregular, that cleaned sand was used as an estimate of the quantity of monazite produced; an additional reason for so doing being furnished by the fact that the greater part of the crude material is cleaned by local mills before shipment, and the grade brought up to 80 per cent. or more of monazite. On this basis, North Carolina produced 607,275 lbs. of the mineral, valued at $125,510; and South Carolina, 148,900 lbs., valued at $26,802. The total for the United States amounted to 846,175 lbs., valued at $152,312. The production for 1905 was 1,352,418 lbs., valued at $163,408. This amount represented in part crude and in part cleaned sand. The monazite market in the United States in 1906 was fairly strong, despite the fact that the price of thorium nitrate was reduced nearly half early in the year by the German combine.

RECENT ADVANCES IN THE MANUFACTURE AND USE OF BLUE WATER GAS.

A paper on recent advances in the production and utilization of uncarburetted water gas was read by Herr Reitmayer before the last meeting of the Austro-Hungarian Association of Gas and Water Engineers, and was subsequently printed in our contemporary, "Gastechniker."

In the first portion of his paper, Herr Reitmayer discussed some of the fundamental principles underlying the successful manufacture of water gas, comparing the ideal producer with a smith's forge where a shallow bed of fuel was raised to incandescence by a current of air travelling at high speed in such fashion that the carbon dioxide formed passed away from the zone of reaction without having any opportunity of reduction to carbon monoxide. The author remarked that it was not possible to construct an actual producer on lines closely resembling the forge; but it was possible to make it resemble the ordinary open coke basket in which a column of burning coke received its supply of air not merely from underneath, but on all sides and at different levels. Hence, though the carbon dioxide which was first of all formed was immediately reduced once or several times, it nevertheless met with a fresh supply of oxygen and was fully oxidized again.

The water-gas installation in which Herr Reitmayer was interested was situated at Wiesenthal, on the borders of Bohemia. The plant consisted of two producers, constructed on the foregoing lines. Full details respecting them were not given in the paper, but the author stated that it was found possible to work the plant under such conditions that the proportion of carbon dioxide remained constant at about 17 per cent. throughout the whole period of the blow. The producers were also apparently so designed that during the run the steam was admitted at the top and at the sides of the vessels. In this manner, perhaps part of the steam passed downwards through the producer near the sides without penetrating the whole column of fuel; but even if this happened it was advantageous, inasmuch as the centre of the incandescent coke was not cooled as suddenly as was usually the case, for the steam did not come into immediate contact with the coke until it reached the lowest part of the producer, where the temperature was at its maximum. It might be thought that such a method of working resulted in the presence of a large quantity of undecomposed steam in the water gas, together with a high percentage of carbon dioxide. This, however, was not found to be the case. The carbon dioxide in the water gas did not exceed 5 or 6 per cent.—practically the same proportion as that present in the gas made in other plants, and the water vapour remained also at a normal percentage.

Herr Reitmayer's water-gas plant had been in regular operation for about eighteen months at the time when he read his paper, and had worked without a single hitch. Great difficulties were experienced in building it; for it was erected at a time when the temperature of the air in the mountainous region served by the undertaking was some 50° below freezing point, and when it was necessary to thaw the roads with coke-fires before pipes could be laid. The cold was so intense that the author anticipated trouble before the summer arrived; but the main had been found perfectly satisfactory. As appeared from the second portion of his paper, the gas was used principally for technical purposes—*i.e.*, for the production of heat—the plant therefore worked only in daytime, and the gas was not carburetted. A good quality of furnace coke obtained from Upper Silesia was gasified. It contained about 90 per cent. of carbon and very little slag. Its calorific power was about 13,000 B.Th.U. per lb. The make of gas was about 102,000 cubic feet per ton; and its calorific value ranged between 270 and 280 B.Th.U. per cubic foot. A certain proportion of the make was used for the production of light; and, indeed, the author had succeeded in employing the blue water gas in inverted gas-burners just as if it were coal gas. The burners used afforded a light of about 60 Hefners from a consumption of 100 litres per hour (about 15·5-candle power per cubic foot). He had also effected some minor modifications in the ordinary coal-gas cooking-stove, so that it was no longer necessary to burn twice as much water gas as coal gas for any given purpose.

Water Gas and the Glass Industry.

The second portion of Herr Reitmayer's communication was taken up with a description of the Bohemian glass industry, and the manner in which he had succeeded in inducing its members to adopt the use of water gas. The small glass articles, such as imitation diamonds, and other trinkets, glass "pearls" (some of which are silvered or gilt inside), buttons, hat pins, cigar holders, and the like that are exported all over the world, and are usually said to be made in Gablonz, are not as a matter of fact manufactured in that town, but are made by the cottagers in the surrounding hamlets which nestle amid the mountain valleys of the Riesengebirge. In former times the whole of the countryside was dotted with smoky chimneys belonging to the small furnaces where the glass was melted. The living and working rooms in these villages were not built alongside a street, but on the steep sides of the mountains in immediate proximity to tiny waterfalls. The waterfalls were used to drive the grinding stones on which the glass objects were finished and polished. In many

cases, indeed, the cottages had no chimneys at all for the combustion products of their fires—the only ventilation being provided by a skylight in the roof. Sanitary and social considerations were almost wholly neglected. Many of the glass objects for which the neighbourhood is famous—for instance the so-called "pearls"—were made from glass tubes; a suitable length of tube being heated, pressed between moulds, and submitted to air pressure from the inside. The glass was then cut off, gilt or silvered on the interior surface when so desired, mounted on threads, and sold in strings. The magnitude of this industry may be gauged from the fact that one particular house of business in the neighbourhood of Gablonz has been in the habit of purchasing fine gold to the value of £60,000 a year for the mere purpose of gilding the inside of the pearls.

Numerous experiments have been carried out to substitute some more efficient form of heating for the old-fashioned fire. Trials have been made with air gas, benzoline, and acetylene; but all have proved abortive, perhaps because the conditions of manufacture were not thoroughly understood and the burners employed were not suitable. The complaints have always been that the colours of the glass articles have been injured. On the other hand, one particular factory in the district has been using water gas for many years in considerable quantities. To some extent, therefore, the glass makers were aware that water gas would not affect the tints of the glass; and in erecting his plant Herr Reitmayer accordingly did not find so much difficulty in obtaining consumers among the conservative population as he otherwise would have had.

As before mentioned, the water-gas installation especially referred to by Herr Reitmayer was erected in the village of Wiesenthal; a second plant is being built at Morchenstern; and a third is to be put up at Josefsthal during the present summer. One other difficulty remained to be overcome in persuading the members of the glass-blowing industry to adopt water gas in place of their customary fires, inasmuch as the glass-blowing is performed with the aid of a blow-pipe flame. The great expense and engineering difficulties encountered in laying the gas-main through the rocky soil of the district rendered it inexpedient to provide a second for the supply of air under pressure from a central plant. The small blower who worked in his own home was therefore left to employ a bellows; but as those who worked on a larger scale required something more efficient, a 10 H.P. gas-engine was laid down to drive a dynamo—current being distributed over the district and delivered to small electric motors of ¼, ½, and 1 H.P. in size, so as to afford a mechanical blast where required. In order to simplify the payment for the gas and air, the people who used the latter were charged an additional sum of (approximately) 1s. per 1000 cubic feet of gas, to cover the cost of the air consumed with it.

During the first month of its activity, the water-gas plant at Wiesenthal supplied about 35,000 cubic feet of gas; the consumption growing so rapidly that by the end of the first year it had reached ten times this figure. There were, said the speaker, more than 5000 glass-blowers living in the neighbourhood of Morchenstern and Josefsthal who would probably abandon their old fires in favour of water gas as soon as the new installations were ready.

The Awards in the Tar-Spreading Trials.

The Judges' Committee appointed by the Roads Improvement Association to carry out the competitions for the best tar-spreading machine and the best preparation of tar for road purposes have made their awards as follows: Competition for the best tar-spreading machine, first prize, 100 guineas and the Association's gold medal, to Thomas Aitken, of Cupar, Fife, for Aitken's Patent Pneumatic Tar-Sprayer; second prize, 50 guineas and the Association's silver medal, to Tarspra Limited, for their 700 gallon "Tarspra" (patent) Thorneycroft motor van. Competition for the best preparation of tar for road purposes, first prize, the Ballymena Woollen Factory Company's 100 guinea trophy and the Association's gold medal, to Messrs. R. S. Clare and Co., Limited, of Liverpool, for Clare's patent tar compo. These tests, it may be remembered, were carried out from May 22 to 24 and on May 27 last, on certain roads in Middlesex and Berkshire, and were noticed in the "JOURNAL" at the time. Since these dates the roads have been kept under constant observation; and, durability being an important consideration, it has not been possible to make the awards until the present time. The cost of the trials was borne by the Royal Automobile Club and the Motor Union of Great Britain and Ireland.

"Water-Works Directory and Statistics."—We have received from Messrs. Hazell, Watson, and Viney, Limited, a new issue of this work, for the year 1907-8. It is the twenty-seventh edition of the Directory; and it was much needed, as its immediate predecessor appeared in 1903. The Editor states in his preface that "every effort has been made to bring the volume right up to date, and to give the fullest and most reliable information obtainable." The Association of Water Engineers have given their support and assistance in the preparation of the volume, which contains a much larger amount of information than was to be found in previous issues. The list of Associations and the index of officials are again included. The price of the volume is 10s. 6d. net.

REGISTER OF PATENTS.

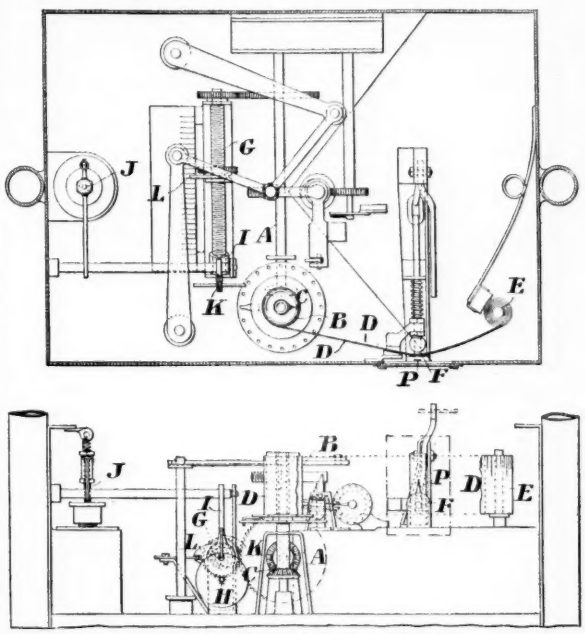
Gas-Meters.

GUNNING, J., of Bournemouth, and HANSFORD, J., of Portland.

No. 16,189; July 17, 1906.

This invention relates more particularly to indicating and recording devices of meters, so that not only the consumption of gas but the value thereof is indicated on a strip of paper bearing a scale of quantities and corresponding values, which is caused to move past an inspection window in the meter frame or index.

The recording apparatus, which may itself be considered as constituting a prepayment device for a meter, may also be combined with any suitable form of ordinary prepayment mechanism—for example, as shown in the engraving.



Gunning and Hansford's Meter-Recording Device.

The shaft A is driven through reducing gear from the ordinary meter mechanism, and drives the spindle of a drum B through bevel gear C. The strip of paper D, bearing a scale of quantities (with or without a corresponding scale of values), is wound on the drum and off the parallel spindle or drum E as the shaft is revolved—the tape speed being proportional to the rate of gas consumption. A friction brake is applied to the tape or spindle to keep the tape taut. The tape passes in front of a spring-urged punch F, which is normally retracted by the displacement of a bell crank lever or equivalent device by the lid or door which gives access to the apparatus, and the opening of which releases the punch and allows it to shoot forward and punch a hole in, or otherwise mark, the strip. Usually the strips would be in duplicate; and the rear strip would (by the action of the marking device on opening the casing) be stamped with the number of the meter or other identification mark, by a rubber stamp carried or actuated by the punch. The rear strip would be taken by the supplier's agent, and the front strip left with the consumer as a record of the quantity consumed and to be paid for. As one end of the strip D is attached to the spindle E, the supply of gas will be cut off automatically by the stopping of the mechanism when the strip is completely unwound, but the end remains attached to the spindle. In order to call attention to the approaching exhaustion of the record strip, the latter portion of it might be coloured red or the scale be printed in a distinguishing colour.

The supply of gas may be arranged to be cut off by the automatic closure of a valve, by any suitable known means, on the consumption of a predetermined quantity of gas. For this purpose, according to one well-known device, in which a traversing pinion is caused to actuate a supply valve through a system of levers, the spindle A is geared with a screw-threaded spindle G, on which is mounted a spur wheel in mesh with a long pinion H ranged parallel with the spindle. The rotation of the spindle consequent on the consumption of gas traverses the wheel, which is guided by the teeth of the pinion H to move axially alon gits spindle, until it encounters and displaces one arm I of a bell crank lever, the other arm of which is connected with the spindle J of the cut-off valve, which is normally held open by a spring. A detent pin K, carried by the bell-crank lever, engages a notch in the axle of the pinion H, or in a disc secured to it, to prevent any rotation of the pinion while the valve is open. The action of closing the valve also disengages the detent, and allows the pinion, and consequently the gear-wheel, to be rotated by a suitable key applied to the pinion spindle—thus enabling the wheel to be set to any desired position on the spindle, and determine the quantity of gas which may pass through the meter before the cut-off valve is automatically closed.

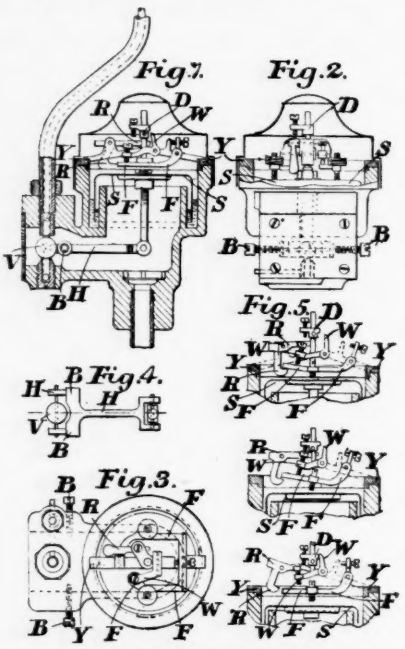
Lighting Gas from a Distance.

BOULT, A. J.; a communication from EDUARD ZICKWOLFF, of Siegen, Germany.

No. 16,454; July 20, 1906.

This invention relates to gas-lighting apparatus of the class in which a gasholder bell is subjected to variations of pressure so as to alternately

open one gas-conduit and close another—a lever with unequal arms being employed to increase the relatively weak action of the bell, so that the conduits are opened and closed with increased force.



Zickwolff's Gas-Lamp Lighter.

Fig. 1 is a section, fig. 2 an elevation, and fig. 3 a plan of the apparatus referred to. Fig. 4 is a closing lever with unequal arms, provided with a ball valve, and fig. 5 shows the stopping and disengaging device in three different positions.

The upper portion of the casing is a receptacle intended to receive the bell S with its closing liquid—mercury. In the bottom portion, between the points B, is mounted an easily swinging lever with unequal arms H, and also valve-seats for the gas-pipes. The small arm of the lever being bifurcated, forms a support for a ball-valve V, which closes the gas-pipes. The long arm of the lever H being hinged to the rod of the gas-holder bell, the opening and closing of the valve-seats take place with a force which is dependent on the proportion between the two arms of the lever, and on the force the floating bell develops during its ascent and descent.

The rod of the gasholder bell engages, by means of a tappet D, with the stopping and disengaging device, the construction of which is as follows: To the arc-shaped bracket Y are hinged: (1) a double lever F, (2) a stop lever W, and (3) a disengaging lever R. Each arm of the lever F is provided with a set screw, and the junction piece of the two arms with a regulating screw. The object of the latter is to bring the lever into the desired position against the finger of the lever, in order to enable it to come into engagement at the desired moment and to hold the lever in its raised position for a short time. The regulating screws have for their object to stop the upward movement of the gasholder bell after its first stage has been accomplished. The stop lever W is a bell-crank lever, the horizontal arm of which is also provided with a set-screw. The tappet D of the bell-rod is also provided with a set-screw. The screws on F are adjusted in such manner that in the position of rest of the apparatus they are a short distance from it. The weight of the bell is so calculated that the normal pressure of the gas cannot raise it; and it is necessary to produce an increase of pressure sufficient to cause it to strike against the screws, but not sufficient to enable it to raise the lever arms F (weighted to any desired extent). The screws constitute, therefore, an obstacle which limits the first stage of the travel of the gasholder bell.

On the bell being caused to rise as stated, the stop lever W falls by gravity into a recess of the tappet D, and the set-screw of the lever comes into contact with the lever F. Increase of pressure intentionally produced lasts only for a short time; the pressure of the gas in the pipe soon returning to its normal condition. Consequently, the bell descends again so long as the stopping device described has not been operated by the engagement of the lever W. Beginning with this moment, the pressure of the gas can descend to a certain minimum without affecting the bell. In order now to counteract the stopping action which has taken place, it is necessary to produce in the gas-pipes a pressure sufficiently strong to raise the bell and the lever F with the balance weights arranged as desired.

During this second stage of the upward movement of the bell, the stop lever or pawl W, owing to the contact of its set-screw with the lever F, is moved away from the tappet D, and the lever R engages, by means of its heel, with the raised lever F. When the pressure wave which has disengaged the stopping device has ceased, the bell can freely descend to its position of rest. During the descent the lever W cannot engage again under the tappet D, as the lever F is held in its raised position by the heel of the lever R, the result of which is that the lever W is held away from the tappet D. Disengagement of the lever F then takes place only when the tappet D has descended sufficiently low to make it impossible for the lever W to get into engagement.

The working of the apparatus is as follows: In the position of rest of the apparatus, the gasholder bell is in its lowest position, and the conduit leading to the illuminating flame is, therefore, held closed by the lever H connected to the ball-valve V; while the conduit going to the bye-pass flame is open. If it is desired to light the main flame, it will be necessary to produce an increase of pressure sufficient to raise the bell up to the first obstacle of the set-screws, but without overcoming it. On the bell being thus raised, the conduits going to the lighting flame will open and light the flame, while those going to the bye-pass flame will be closed by the ball V dropping on its seat.

In order to allow further movement of the bell S and lever H, the latter is not rigidly connected to the ball V, which is supported in a clearance hole, slot, or the like, in the forked end of the lever, so that the opening in it is closed with a pressure due to the weight of the ball, while the end of the lever is free to continue the movement in a downward direction. As now the bell has been stopped in the raised position, the lowering of the pressure of the gas, even to a minimum, and the variations of pressure in the gas-conduits cannot affect the apparatus. In order to give as large a play as possible to these variations of pressure, the patentee prefers to make the bell sufficiently heavy to prevent it from being raised, except by a comparatively strong pressure, and also to reinforce by weights the obstacle limiting the first stage of the movement of the bell, to such an extent that it should be necessary to produce in the gas-pipe a considerable increase of the pressure capable of raising the bell up to that obstacle in order to operate the bell so as to overcome it. This second large increase of pressure brings about a disengagement of the system, and the bell freely descends again, closing the conduits going to the lighting flame, and opening those to the bye-pass flame, which is then again ignited.

The weights on the levers F can be arranged so that a certain number of burners would be more charged than others. In this case, it is necessary to have another increase of pressure, in order to extinguish the burners. The burners already extinguished will then burn only a little time.

The desired increase of pressure can be brought about (the patentee remarks) by the gas-works at any hour, according to requirements, and it will not be permanent, but would "be obtained merely by a passing wave of pressure in the network of pipes."

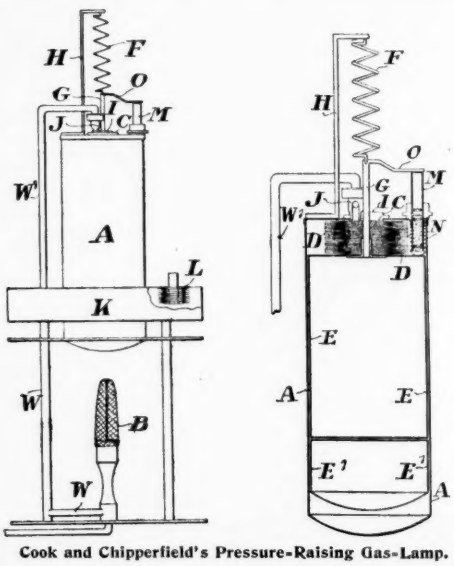
Compressing Gas or Air for Lamps.

Cook, E. S., of South Lambeth, S.W., and Chipperfield, W. H., of St. Pancras, N.W.

No. 20,521; Sept. 15, 1906.

This is an apparatus for the compression of gas or air for lamps of the type wherein "the heat given off by the burner is converted into mechanical energy for the compression of air or gas for use at the burner."

The illustrations show an elevation of the lamp with the compressing apparatus fitted to it; also a sectional elevation of the compressor on an enlarged scale.



Cook and Chipperfield's Pressure-Raising Gas-Lamp.

The hollow metal body A is placed above the burner B, so that the heat will impinge upon the lower portion of it. The vessel A has an opening C formed centrally in its upper end, to the boundary of which is attached a hollow flexible, extensible, and compressible metallic body D (preferably annular in form), to which is attached an inner hollow body E composed, preferably, of metal, and free to move within the outer vessel. The inner body is constructed in two parts E E1 for the purpose of reducing the conductivity, thereby keeping the variation in temperature greater at each end than would be the case in an inner body or displacer made in one piece. Or it may have a dividing diaphragm about its centre. Its weight is held in suspension by a spring F, through the medium of the rod G; the upper end of the spring being attached to a rod H.

The central opening in the upper end of the outer body is closed by a cover I, to which are connected inlet and outlet valves. The outlet valve J communicates by a pipe W1 with a receiver K, provided at L (which is a flexible metallic body, weighted to a predetermined pressure, and open at its upper end to the atmosphere) with an arrangement for equalizing the pressure of the gas or air within, which is then conducted through the pipe W to the burner for use as required. The inlet valve J1 communicates from the gas supply or the atmosphere into the body D.

The lower end of the rod G is attached to the top of the upper inner chamber E; the rod passing up through the cover I and being capable of reciprocating movement. A cylindrical slide valve M is attached to

the outer vessel A, and is provided with ports open to the atmosphere at each end of the stroke. An arm O, mounted on the connecting rod G and moving with it, extends above the slide valve M so as to ensure its downward movement.

The application of heat to the lower end of the apparatus expands the air in the outer chamber A, thereby increasing its pressure, and causing the inner flexible metal body D to contract, and carry with it the hollow body E, thereby raising the valve M. This movement continues until the upper ports in the valve M are open to the atmosphere, when the expanded air in the outer chamber will be allowed to escape to the atmosphere through the lower ports. The pressure in the outer vessel having been thereby reduced, the vessels E and E^1 commence to fall by gravity—thereby causing the expanded air at the bottom and heated end of the chamber to pass upward between the inner and outer chambers to the cooler ends. Here contraction takes place; creating a partial vacuum by which the further downward travel of the chamber is continued, until the lower ports in the valve M (which has been caused to follow the movement of the inner chamber by the action of the spring) again open communication between the outer chamber and the atmosphere through the open upper end, and admit a fresh supply of air from the atmosphere to take the place of that previously released. These movements and operations recur in regular cyclical order.

The motion imparted to the inner flexible metal body D causes it to act as a pump, by which gas from the gas supply, or air from the atmosphere, will be drawn into it through the valve J^1, and expelled through the outlet valve J, at an increased pressure, to the receiver K.

High-Pressure and other Bunsen Burners.

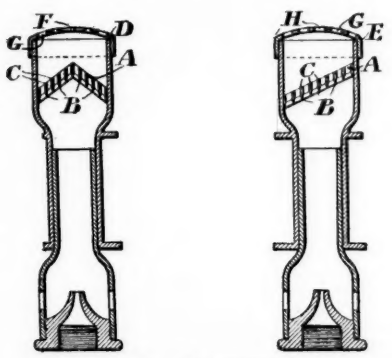
Wouwermans, P. von, and the Gasspar Unternehmung nach System Wouwermans, Halbmayr and Co., of Vienna.

No. 20,643; Sept. 17, 1906.

This invention relates to improvements in the bunsen burner described in patent No. 8544 of 1906; and it is intended to increase the effect of it as much as possible by giving the distributing grate or distributor such a shape that it "will offer the largest free section with the least resistance to the entering gas;" secondly, to make the size of the holes in the cap of the burner to correspond with the pressure of the gas.

This "largest free section available with the least resistance to the entering gas" is obtained by making the distributor (containing the small channels) conical, or in the shape of a double sloping roof, or by simply arranging it at an incline, at the same time sharpening the channel walls, which must be kept as thin as possible on their lower ends, so that they will not offer resistance to the entering gas, but rather act to cut the current.

With regard to the burner cap, it has been found that, in the case of high pressure, a better result is obtained if the holes are limited to two or three outer rows; the holes of the inner rows being of a smaller diameter than those of the outer row, and the centre part being a blank. In case of low pressure, it is, however, preferable to perforate the centre portion as well, and make the holes of the centre part of the same diameter as those of the outer rows. At the same time it is advantageous to make the cap smaller in diameter.



An Austrian High-Pressure Burner.

The illustration shows one burner, the distributing grating in the head of which is constructed in the shape of a double sloping roof, and another where the grating is arranged at an incline.

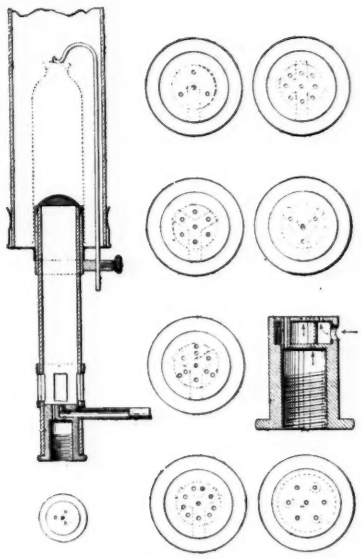
The head of the burner first shown is provided with a distributing grating or distributor A, the lower edges B of the walls C of which are bevelled at both sides, so as to present cutting edges to the current of gas and air. In this instance the distributor is constructed in the shape of a double sloping roof. In the other, the distributor A is constructed in the shape of a shed-roof, and with walls C having their lower edges bevelled. The first burner is provided with a cap D, adapted for high gas-pressure, having two circumferential rows of holes G; the holes of the inner row being of smaller width than those of the outer one. The centre portion F of the cap is entirely without holes. The second burner is provided with a cap E adapted for low gas-pressure, with the centre portion of the cap perforated with holes H, or about the same diameter as the holes G of the outer row.

Compressed Air-Burner for Gas-Lighting Purposes.

Murinick, A., of St. Petersburg.

No. 22,216; Oct. 8, 1906.

This invention has reference to an arrangement wherein jets of gas and compressed air issue into the mixing-chamber of a burner of the bunsen type, constructed in one piece. Its passages and outlets are so arranged that the gas-jets issuing through certain of the passages may be enveloped by air both internally and externally; the internal supply of air being delivered to the burner under pressure, while the external supply is induced through apertures in a bunsen tube in connection with which the burner is intended to be used.



Murinick's Compressed-Air Gas-Burner.

The burner shown "admits of many variations and modifications in the arrangement and combination of the outflow apertures for the gas and compressed air." There is, first of all, a central vertical section through the burner with its gas and air distributing means; a plan of the air and gas inlet aperture; and then a series of different forms of construction for the arrangement of one or more air outlet apertures. Lastly, there is a central vertical section through a special form of distributing means, and a plan of the same device.

The burner-tube is provided, as usual, with a perforated chimney gallery, and is mounted on an air and gas distributing body, which, in the present case, is in the form of a cap. Above it, the tube is formed with several air-inlet apertures, which can be opened more or less by a slide. The upper closed portion of the cap is formed with a lateral passage extending to the side, and to which the inlet tube for the compressed air is connected. A central fine hole forms a nozzle through which the compressed air is fed to the mixing-chamber of the burner-tube. Arranged symmetrically around this nozzle are a series of holes through which the gas-chamber of the cap communicates with the mixing-chamber.

The stream of compressed air, on being admitted, intimately mixes with the streams of gas; and by the energy of the issuing gaseous mixture more air is drawn in through the aperture shown, and mixes with the stream of gas. Thus the gas is enveloped between a supply of compressed air and a supply of air induced from the atmosphere surrounding the bunsen tube.

In the subsidiary forms of the burner, further distribution of the compressed air is attained. In addition to the passage already referred to, there are provided branch passages formed with symmetrically arranged holes for the compressed air. By increasing or reducing the number of branch passages and the holes therein, "a very wide range in the supply or distribution of the air can be effected."

In the modification of the distributing member, the upper part containing the air and gas passages is made in the form of a socket or chamber to which the air is fed through a lateral hole. In this way, independent distribution of the air-holes is rendered possible. The gas is here supplied through a series of tubes extending through the socket or chamber of the body.

Prepayment Gas-Meters.

Morrison, A. C., of North Brunswick, Victoria.

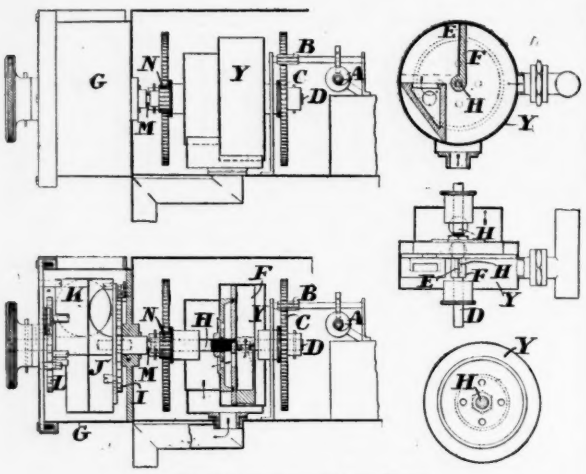
No. 25,873; Nov. 15, 1906.

This prepayment gas-meter is of the kind in which a rotating wing moved by the coin-operated mechanism, co-acts with a rotating seat moved by the paying-out mechanism of the meter or *vice versâ*.

The paying-out shaft of the meter (see p. 516) is geared through a screw A, pinion B, and wheel C, to a shaft D, on which is mounted a valve E—a radial metal wing F carrying a leather valve-face. A valve-seat is also mounted on a shaft H, supported partly within a socket on the shaft D and provided with a spur-wheel arranged to mesh with a pinion on the coin-operated shaft M. Thus when the shaft is rotated for a short distance, the valve-seat is moved away from engagement with the wing-valve F, and the paying-out shaft of the meter is free to move. In consequence, gas may be taken until the shaft has once more caused the valve F to close.

On rotating the valve-seat away from the wing-valve F, gas flows from the meter into the space Y, connected with the measuring-out apparatus. The passage of gas through the meter causes the rotation of the paying-out shaft, or, conveniently, the usual indicator shaft of the meter to which the screw A is connected, and thereby effects the rotation of the valve F towards its seat. The gas continues to flow till the valve once more engages with its seat, thus stopping the flow of gas. The quantity of gas given for each coin may be altered by varying the relative displacement given to the valve and valve-seat at each insertion of a coin.

The mechanism for effecting the displacement of the valve-seat (the coin-operated prepayment device) is constructed as follows: The pinion



Morrison's Prepayment Gas-Meter.

N, mounted on the prepayment shaft M, is arranged within the meter case so that the prepayment shaft passes through the case into a preferably cylindrical chamber G, in which the coin-mechanism is placed. Mounted so as to rotate with the shaft M, and within this coin-mechanism case, is a ratchet-wheel I, having a fixed detent, so as to limit its rotation to one direction only. The end of the shaft is drilled centrally so as to accommodate one side of a pivot carrying a segmental plate J. On the side of this plate (adjacent to the ratchet-wheel I) is a pawl, pressed by a spring or the like so as to cause it to engage with the teeth of the ratchet-wheel I. On the opposite side of the plate J are two pins, arranged at different radii—one adapted to engage with a coin when inserted, while the other is arranged to engage with a permanent part of the coin-pocket. The two pins are arranged at an angle adjustable for convenience in varying the price of the gas. In the form illustrated, this adjustability is effected by providing a number of holes arranged in a circle, and into which a pin, which engages with the coin, may be inserted.

The coin-pocket K shown is adapted to be rotated by the operating handle. One side of the pocket is adjacent to the segmental plate J, and is cut away so as to allow free passage of the pin, which engages with the coin only when a coin is inserted. When, however, a coin is inserted in the position shown, the rotation of the coin-pocket by the operating handle causes the rotation of the segmental plate J, and thereby effects the rotation of the prepayment shaft. A pin engages with the coin-pocket on its backward rotation, and thereby brings the segmental plate J back into a position where, on the insertion of a further coin, another rotation will be given to the shaft M.

The side of the coin-pocket remote from the segmental plate has a slot arranged to clear a number of pairs of pins projecting from a ratchet-wheel, mounted so as to rotate freely on the shaft to which the operating handle is attached. This shaft passes through the cover of the coin mechanism case, and an operating handle is fixed on it. On the inside face of the cover there are mounted two stop pins, for adjusting the amount of rotation given to the coin-pocket, and causing it to stop exactly opposite the inlet and outlet coin-slots in the casing. Two coin-slots are provided in the casing—one for the insertion of the coin, the other for the rejection of the coin into a suitable storage chamber. On the inner face of the cover, there is also mounted a pawl, adapted to engage with the ratchet-wheel L, carrying a pair of pins. By this means the rotation of the ratchet-wheel is limited to one direction. When a coin is inserted in the pocket K, it passes between one of the pairs of pins and thus couples the ratchet-wheel to the coin-pocket; while the ratchet-wheel, co-acting with the pawl arranged on the inner face of the fixed cover, can only rotate in one direction. By this means backward rotation of the coin-pocket, after a coin has been inserted, is rendered impossible.

Washing Gases.

BACHMAN, F. E., of Port Henry, New York.

No. 28,148; Dec. 10, 1906.

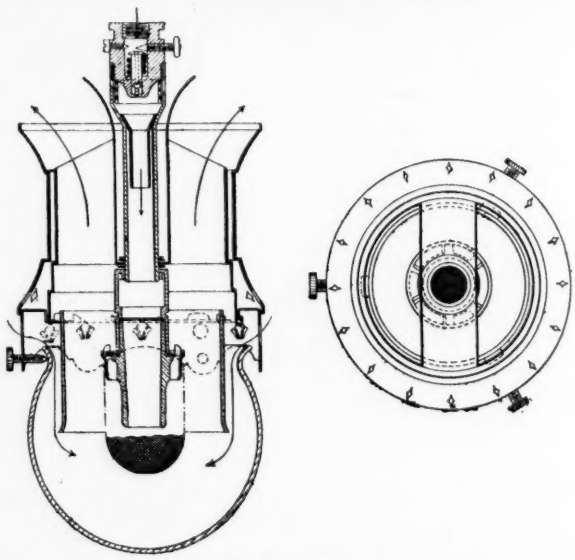
This is an apparatus for separating dust from (more especially) furnace gases by throwing it outwardly, by centrifugal force, against a wall, from which it is washed down without substantially spraying the gas. With this object the gas is given a rotatory path; spray pipes being used for washing the deposited dust from the casing on which it has been deposited by centrifugal action. The invention further consists in giving the gas a spiral path; the spray pipes being used to wash the dust both from the spiral shelf and from the casing.

Inverted Incandescent Gas-Lamps.

GRAETZ, M., of Berlin.

No. 7047; March 23, 1907.

This inverted incandescent gas-lamp works at low pressure. For obtaining in such lamps a high lighting power, the patentee points out, the gas conducted to the mantle has to be mixed largely with fresh air; but difficulties have hitherto arisen from using gas under low pressure, owing to the heating of the mixing-tube. The temperature of the mixing-tube is gradually increased and then constantly maintained; and thereby "the energy of the gas is greatly diminished, so that fresh air cannot be induced in such quantities as is required for good combustion; the lighting power is thereby decreased; the flame begins to soot; and, furthermore, the flame flashes-back." It is the heating of the mixing-tube that causes these defects; and it has been proposed to make the lower part of the tube of non-conducting material—for instance, glass—and for the purpose of deflecting the hot combustion gases, at the upper end of the insulator, a protecting cone has been arranged. It is also well known to make the mixing-tube along its whole extension in the form of a heat insulator. A constant improvement, however, has not been obtained from these provisions; the drawbacks being "due to the fact that the burner is considerably heated after a certain time, for the hot combustion gases ascending outside the mixing-tube or striking the same, effect gradually a considerable heating of the tube, and this heating is constantly maintained." The insertion of non-conducting materials has only the effect of retarding the increase of temperature till its maximum point is reached; but it does not prevent the heat from reaching the mixing-tube.



Another "Graetzin" Lamp.

It is to overcome these drawbacks that the present invention was designed. As shown, a non-conducting mixing-tube is used, and at the same time provision is made to remove the heat collection and storage respectively, as occurring in the above-mentioned devices. For obtaining the latter, the heat of the mixing-tube is continuously carried away; and the mixing-tube is so arranged relatively to the remaining burner parts that the hot combustion gases are absolutely prevented from coming in contact with the former, and the hot gases are exhausted so as to be out of contact with the mixing-tube, and so that the latter is constantly surrounded and ventilated by fresh air.

The mixing-tube can be made in several different ways. The non-conducting material can be glass, porcelain, clay, or magnesia; but also heat non-conducting metal alloys can be used—for instance, argentan, nickelin, constantin, or manganin. Or the mixing-tube can be provided on the inside with a shell of a non-metallic heat non-conductor; or a mantle-tube of heat non-conducting metals can be provided—thus obtaining an air-space which has an insulating effect. However, it is required that the outer air is enabled to constantly carry away heat from the mixing-tube. For increasing the action of the air, the surface of the mixing-tube in contact with the cooling air can be enlarged, by means of radial ribs or corrugations.

Lighting and Extinguishing Gas-Lamps from a Distance.

HIMMEL, G., of Tuebingen, Germany.

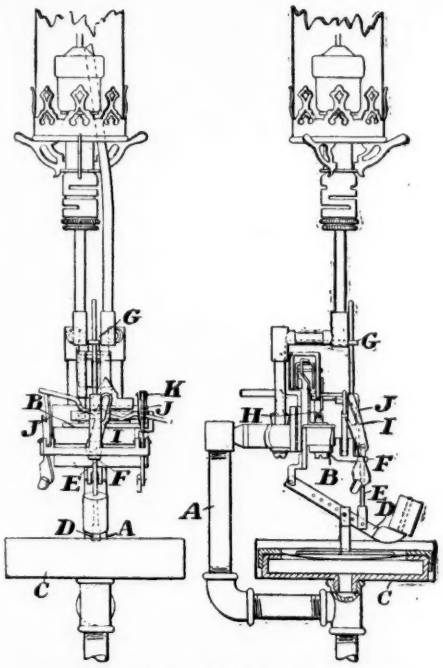
No. 10,237; May 2, 1907.

This is a device for enabling gas-jets to be lighted and extinguished from the gas-works or other central station at any desired time—serially or altogether; being operated by a momentary increase of pressure in the main.

The patentee claims to avoid defects of other similar lighters by a peculiar valve arrangement which is operated by the gas pressure, and by the member regulating the gas supply being compulsorily operated in such a way that "the lighting and extinguishing take place only in the desired manner, and lighting in series may be suitably performed." A further advantage is also said to be attained—that is, by accidentally simultaneously lighting or extinguishing a large number of jets, a variation in the pressure is produced in the pipe, which causes the directly influenced member to be operated. With a suitable load, this operation does not cause a premature temporary opening and closing of the valve. Finally "the separate parts are easily accessible, and also the entire device is removable, while after its removal the lamp is still adapted to be used in the ordinary way without further alteration."

The apparatus comprises a main burner pipe and a lighting or pilot burner pipe, both fed from one main pipe. The gas flows from the latter by an intermediate pipe A to a distributing head, from which, by means of valve mechanism or a governor, it is conveyed alternately to the main burner and to the pilot burner. Three passages are provided in the head, all of which open into a recess at its surface. A valve B provided with a recess also slides on the head, which recess, according to the position of the valve, connects the passages successively, so that gas may alternately flow to the main burner and to the pilot flame, while, of course, the dimensions must be such that the passage closed is only fully closed when the other is already opened, in order to prevent the extinction of both flames.

A wave of gas pressure is now used for governing or operating the valve B, which pressure (given from a central station) is capable of being regulated. For this object a diaphragm is connected with the main pipe, and is easily and regulatably lifted by the pressure. By means of a disc resting on the diaphragm, a lever D, pivotally and displaceably connected with it, is lifted. A vertically movable rod E is also flexibly mounted on the lever, and is guided, on the one hand, in the arm F, and, on the other hand, in a lug G, while the arm also serves simultaneously as a stop in order to prevent the bar descending too far.



Himmel's Gas-Lamp Lighter and Extinguisher.

The vertical movement produced by the gas pressure is now converted into a horizontal one, and also simultaneously into a turning one. The horizontal movement operates a displacement of the slide valve B. The latter has for this object a connection H, which is provided in the middle with a triangular projection to produce the turning movement. For displacing the slide valve B, the projection has an aperture in which a pin engages, which is carried by an arm I – pivotal on a pin mounted in the arm E. If, then, the arm I be caused to rock, its pin moves the valve B; and this movement is brought about by lifters mounted on pins pivotal on a bridge-piece on the rod E. The lifters are held by weights in a vertical position, and have at their upper ends a hooked jaw J, with which, in rising, they alternately engage beneath a cross bar of the arm I and carry it with them, so that the arm is caused to turn.

Now in order, on the one hand, to prevent the extinguishing of the series of jets, which, when the others are extinguished, may be required still to continue to burn, and, on the other hand, to prevent the latter being lit when the first are extinguished, one of the lifters is provided with a flap or lug pivoted on a pin K. It can be turned upwards, and is also so bent that it pushes past the bar in the upward non-working movement of the lifter and closes the jaw J, while on next descending it remains lying on the bar, and allows its jaw to engage at the next movement upward. In order to allow of this, and also to bring the lifters alternately into engagement, the bridge piece is pivotally arranged by the rod E having a little play at its point of connection with the lever D.

One method of working the arrangement is described (by means of a series of diagrams accompanying the specification) where a lamp is (say) to burn during half the night and another lamp to burn during the entire night, assuming that it is intended to extinguish the first series of jets at twelve o'clock midnight and the other series at five o'clock in the morning.

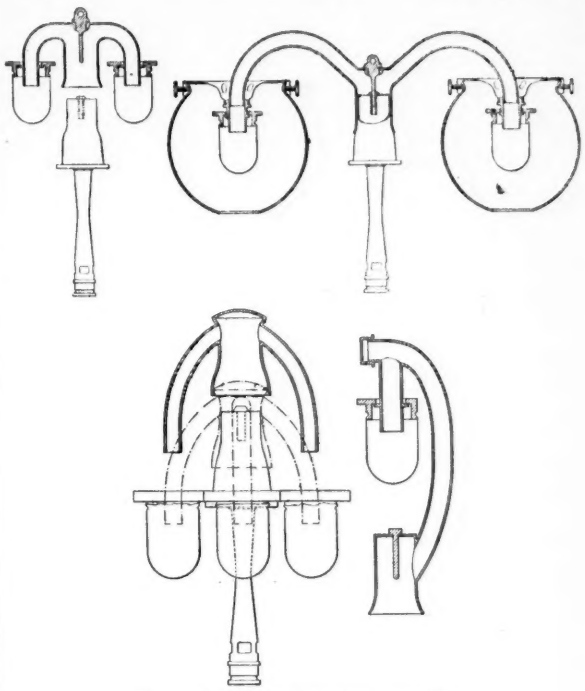
Converting Upright into Inverted Incandescent Gas-Lamps.

COWAN, T. W., of Rotherham.

No. 8936; April 17, 1907.

The inventor provides a chamber or cap (adapted to be passed over the upright burner after the removal of the mantle rod) with an arm or arms opening into the chamber at one end and, at the other end, turned down and carrying, or else constituting an inverted burner. The inverted mantle is carried by supports on the turned-down end, or else is supported by a separate piece resting on the base of the upper part of the upright burner. The chamber or cap is preferably provided with a central internal peg or pin, which engages in the opening for the mantle-rod in the upright burner, and is of such a size that it will slide over the top of the upright burner. Thus this "adapter burner" can be readily applied to, and removed from, any ordinary upright burner.

The illustrations represent different forms of the "adapter burners." First of all there is a Welsbach-Kern burner in elevation and (in vertical section) a two-light "adapter burner" applied to it. Then there is a like arrangement, but with the arms of the "adapter burner" extended so as to take globes or glasses round each mantle. Next the "adapter burner" is shown with a separate mantle-holder supported on



Types of Cowan's "Adapter Burner."

the base of the upper part of the upright burner. There is also an "adapter burner" for one mantle only.

APPLICATIONS FOR LETTERS PATENT.

17,450.—NIKIFOROFF, A., "Treating naphtha and carburetting water gas to obtain aromatic hydrocarbons." July 30.
17,464.—GASMOTOREN-FABRIK DEUTZ, "Internal combustion engines." July 30.
17,566.—LYTHGOE, G., "Swivel bye-pass gas-bracket." Aug. 1.
17,575.—BRAY, J. W., "Vertical inverted burner." Aug. 1.
17,632.—POLESCHOWSKY, J., "Gas-burners." Aug. 1.
17,637.—EWART, G. H., "Water-heaters." Aug. 2.
17,755.—AMOR, G. W., "Condensers for gas, &c." Aug. 3.
17,786.—CASTLEMAN, F. M., and STEWARTS & LLOYDS, LIMITED, "Valves." Aug. 3.
17,802.—LESSING, G., "Process applied to coke-ovens securing bye-products, for the treatment of gases and vapours rising in the ascending-pipes between coking periods." Aug. 6.
17,819.—BOOTH, H. S., "Internal-combustion engines." Aug. 6.
17,840.—RUSSELL, R. J., "Gas lamps and burners." Aug. 6.
17,858.—KOPPERS, H., "Retort-furnaces for manufacturing gas and coke." Aug. 6.
17,875.—GLOVER, T., "Retort-settings for the production of illuminating and other gas, coke, and other residuals." Aug. 6.
17,889.—REESER, H., and WAMPACH, G., "Mantles for incandescent gas-burners." Aug. 6.
17,912.—WILKE, C., and THE SIMON-CARVES BYE-PRODUCT COKE-OVEN CONSTRUCTION AND WORKING COMPANY, LTD., "Coke-waggons." Aug. 7.
17,913.—WILKE, C., and THE SIMON-CARVES BYE-PRODUCT COKE-OVEN CONSTRUCTION AND WORKING COMPANY, LTD., "Quenching coke." Aug. 7.
17,929.—JUNKERS, H., "Gas cooking apparatus." Aug. 7.
17,932.—HINSELMANN, W., "Conveying coal on inclined lines." Aug. 7.
17,956.—GALLAGHER, R. W., "Billing machines for meters." Aug. 7.
17,984—SCHROER, W., "Conveyor spirals." Aug. 7.
17,986.—CARROLL, L. D., "Water-gas apparatus." Aug. 7.
17,987.—AINSWORTH, J., "Gas-generating apparatus." Aug. 7.
17,991.—ERNST, E. U. G., "Production of lighting gas." Aug. 7.
17,998.—SHERWOOD, I., "Suspending incandescent gas-mantles." Aug. 7.
18,010.—ADAMS, M. J., "Gas-generating apparatus." Aug. 8.
18,025.—OAKMAN, R. N., "Opening and closing gas-valves at a distance." Aug. 8.
18,026.—LOOMIS, B., and PETTIBONE, H., "Making and delivering mixed gases to gas-engines." Aug. 8.
18,056.—HOLLAND, H., "Carburettors." Aug. 8.
18,098.—HABICHT, P. & C., "Internal-combustion engines." Aug. 9.
18,118.—PARKER, T., "Distillation of carbonaceous substances." Aug. 9.
18,135.—RADCLIFFE, J., "Treatment of alkaline effluents." Aug. 10.
18,139.—CLIBURN, A. L. & F. P., and THOMPSON, G., "Clip fastenings for pipes." Aug. 10.
18,141.—JONES, A. O., "Coke-ovens." Aug. 10.
18,153.—WILTON, G., "Treatment of producer gas, water gas, or intermediate gases, or other poor gases, with particular reference to the firing of coke-ovens." Aug. 10.
18,156.—SCHIRP, H., "Carbonizing plants." Aug. 10.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Application of the Sliding Scale and Auction Clauses to Gas Companies.

SIR,—Your very interesting articles headed "The Centenary of Gas Lighting," recalling the early history of our useful industry, are worthy, as appears to be suggested, of republication in book form. That being so, I should be glad of the opportunity of a few words of explanation on the subject of the sliding-scale which is dealt with in the last number of the "JOURNAL," so that the proposed republication may be as accurate as possible.

The writer says: "London cannot claim to be the originator of the sliding-scale"—meaning, of course, its application to gas companies; for the sliding-scale probably originated in the remote and unknown past. The so-called sliding-scale, applied to the Sheffield and West Ham Gas Companies, and I believe to one or two others, is very imperfect, limited in its action, and has long been quite inoperative. Its introduction was probably due to the desire to neutralize the limitation of the dividend to 7 per cent. on new capital. In the West Ham Gas Company's case, the new capital was limited to 7 per cent. dividend so long as the price of gas was not reduced below 4s. 6d., with the proviso that at a 4s. 3d. price the dividend payable should be 8 per cent., at a 4s. price, 9 per cent., and at a 3s. 9d. price, 10 per cent. There this imperfect and limited sliding-scale stopped, and nothing further has been done with it.

Whether it gave me the idea for the introduction of a complete sliding-scale, I do not remember; but my claim is that I was the originator of the application of the up-and-down complete sliding-scale to gas companies, whereby gas dividends, following reductions or increases in the price of gas, should rise above or fall below the standard rates fixed in Acts of Parliament. The controllers of the gas industry almost universally ridiculed my proposal that dividends should be allowed to rise above 10 per cent. as the price of gas was reduced. They said Parliament would never listen to it; and that even if Parliament agreed, so soon as any gas company increased their dividend above 10 per cent. there would be another public outcry and agitation of the kind that in those days had become chronic. Instead of that came reduced prices, increased dividends, and—best of all—a lasting peace.

A word about the auction clauses. They were not mentioned in 1875 before Mr. Forster's Committee, and, I believe, not even thought of; but probably the proceedings before that Committee led the late Mr. Farrer (afterwards Lord Farrer), then the Secretary to the Board of Trade and the author of the auction clauses, to introduce them. He did so in the Gaslight and South Metropolitan Companies' Bills of 1876; and in 1877 he induced Parliament to adopt the auction clauses as a Standing Order. Mr. Farrer said that henceforth gas shareholders should not have allotments of new gas capital at par, whereby they obtained high premiums for doing nothing, to the disadvantage of the public. The late Mr. C. H. Parkes, the Board of Trade Official Auditor of the London Gas Companies' accounts, told me that he had never liked my proposed sliding-scale whereby dividends might be increased above the standard rate until Mr. Farrer proposed the auction clauses. "Then," said Mr. Parkes, "the auction clauses are the proper complement to the sliding-scale; and the two together have my full approval."

Thus combined, they have made gas shareholders and consumers partners—the only really satisfactory settlement of the problem of the supply of public utilities (which must be monopolies, whether they are in the hands of companies or corporations), the advantages of both monopoly and competition being thereby secured. They have given consumers cheaper gas and shareholders higher dividends (upwards of £3,000,000 extra in London alone, according to Mr. Haward of the London County Council). They have saved London at least from a municipal supply of gas. They have provided a safe investment, at a fairly good rate of interest, for the savings of the thrifty; and they have helped more than anything else to bring peace to the gas industry.

GEORGE LIVESEY.

Aug. 17, 1907.

Capital Expenditure of Gas Companies and Local Authorities.

SIR,—I did not intend to trouble you further; but may I say that the more these figures are multiplied, and the more one sees of the extent to which they may be criticized, the more do I become convinced that the course taken by me with regard to my evidence was the right one. Your readers, both laymen and experts, must be already sufficiently bewildered; and therefore I will with your permission address myself, as briefly as I can, only to one or two points which appear to me to stand out with the greatest clearness.

In the first place, you say I ought to have explained, by my evidence, the causes which tend to widen the difference between the capital indebtedness of the two classes of undertakings. Perhaps I might have done so; but what, after all, does this amount to? It is a subject upon which much might be said, not always to the advantage of the Companies; and I was ready and willing to answer to the best of my ability any questions that might be put to me by the opposing Counsel backed by experts, whose assistance during the hearing you ignore. Apparently, however, they did not think it worth while to pursue this matter. You also seem to think that it would have been a fairer way of presenting my figures had I given the actual expenditure per million cubic feet sold. To do this I should have had to include on the one side a certain amount of goodwill, owing to additions made to the Local Authorities Returns since 1882. This could have been got over by a comparison of only those undertakings of both kinds included in both the earlier and latest returns; but you were not satisfied with this when I did make it, on the ground that it was not fair to the Companies. The comparison of which apparently you do approve is necessarily incomplete, and could not therefore be accepted as conclusive evidence; while a suspicion of partiality almost invariably attaches to almost any method of selection. By my method these difficulties are avoided; every conceivable circumstance is embraced; and it shows, clearly and simply, the extent to which the local authorities are reducing their capital indebtedness.

CHAS. HUNT.

Beckenham, Aug. 17, 1907.

["By my method these difficulties are avoided; every conceivable circumstance is embraced; and it shows, clearly and simply, the extent to which the local authorities are reducing their capital indebtedness"—to also, "by my method," the great disadvantage of those many companies who have been dealing with their capital accounts wisely and well. A great suspicion of unwarranted "partiality" attaches to the rolling up of those companies in the total of 482—composed of all sorts and conditions, working in all sorts and conditions of places—and comparing them with only 270 local authority concerns, many of which are favoured greatly beyond the average gas company undertaking. So many things may exist among the 212 excess undertakings that would act very detrimentally in a comparison; and between the statutory gas companies and the local authorities no really approximate relation does obtain. Of the 270 local authority undertakings, no less than 82 are situated in Lancashire and Yorkshire; and half of the total are found in Cheshire, Derbyshire, Durham, Lancashire, Leicestershire, Nottinghamshire, Staffordshire, Warwickshire, and Yorkshire. Touching our correspondent's point that, if his method of presenting the figures to the Lord Committee was unfair, he was "ready and willing to answer to the best of his ability any questions that might have been put to him by the opposing Counsel backed by experts, whose assistance during the hearing you ignore," Counsel and expert witnesses for the Company were not to know at the time Mr. Hunt gave his evidence that the latter would not have an opportunity of occupying the witness chair, through the Lords Committee being satisfied, on the promoters' case alone, that a case had not been made out for purchase. But this little fling does not absolve of responsibility for deriving a high average by the use of poorly circumstanced concerns, and tarring the whole with the result. However, we understand from our correspondent's present communication that he does not desire to pursue the matter further. But, for our own part, we think it may be useful later on, when time permits, to go into the question with more fulness, to show, with still greater clearness by the use of the returns, that, without making a selection so as to compare like with like, a serious injustice is done to a large number of gas company undertakings by averaging the capital of the whole per million cubic feet sold as our correspondent did originally. Meantime, readers of the above communication will bear in mind the points of the editorial notes to the letters that were published on July 16, 23, and 30, and Aug. 13, and judge accordingly.—ED. J.G.L.]

Gas Companies and the Price of Coal.

When sending a report of the proceedings at his Company's recent half-yearly meeting, the Chairman of a Provincial Gas and Water Company wrote: "May I draw your attention to my remarks on the coal question, as affecting gas companies, consumers of gas, and the public generally, as coal users. I do not know how far the space at disposal in the "JOURNAL" may allow of these remarks being noticed by you; but in any case I hope you will agree with me that some effort should be made by gas companies throughout the country to protest energetically against the heavy increase in coal prices caused by recent legislation, and more especially by the withdrawal of the export coal-tax. An opportunity to do this occurs at the time of the half-yearly meetings; and as coal has recently gone up in price to an alarming extent—both for ordinary uses and gas manufacture—the Chairman's remarks at these meetings are likely to find popular support. I need hardly say that I am quite indifferent as to my personality being prominently or otherwise brought out in the matter; but I do not wish my remarks to be taken as having a political meaning."

Improvements at the Burton Gas-Works.

At the meeting of the Burton-on-Trent Town Council last Wednesday, the Gas and Electricity Committee recommended the acceptance of the tender of Messrs. John Walsh and Sons, of Halifax, to put into working condition the nine settings in No. 5 retort-house; and they also suggested having two retort-house governors fixed on top of the retort-bench by Messrs. W. J. Jenkins and Co., Limited, of Retford, and four Dillamore tar-columns erected by the same firm. The Mayor (Alderman Lowe) explained that the retort-house was built in 1898; the contract for the benches being let to the firm who submitted the lowest tender. The retorts had not lasted so well as was expected, having only been used for about a year altogether. Now it was necessary to take out some of the work. The other improvements recommended would make the gas more equal in illuminating power, and its manufacture cheaper. The recommendations were adopted. Referring to this matter, the writer of "Local Topics" in the "Burton Daily Mail" last Thursday said: "The reforming hand of Mr. Bell is seen in the expenditure of over £830 on one of the retort-houses, the erection of new tar-columns, and other minor improvements at the gas-works. That Mr. Bell has completely gained the confidence of the Council since he took over the post of consulting expert was shown by the fact that the expenditure, after the Mayor's concise and able explanation, was agreed to without a dissentient voice yesterday. I, for one, consider that Mr. Bell is giving a new lease of life to the gas undertaking."

LEGAL INTELLIGENCE.

DAMAGE TO ROADS BY EXTRAORDINARY TRAFFIC.

Some weeks ago the Reigate Rural District Council took proceedings in the Redhill County Court against the Sutton District Water Company, to recover £238, the cost of repairing roads alleged to have been damaged by the defendants through the use of heavy traction-engines in the construction of a reservoir. At the conclusion of the plaintiffs' evidence, Judge Scully held that there was no case, as it did not appear that the damage done was in consequence of any orders given by the defendants, who had no control over the haulage. From this decision the plaintiffs appealed; and the matter came before Justices Darling and Lawrence, who ordered a new trial. The case was heard by Deputy-Judge Humphreys, whose judgment was read by Judge Scully at a recent sitting of the County Court. His Honour said that for the purpose of the construction of the reservoir it was necessary that a large quantity of ballast and other materials should be taken to the site, principally in trucks drawn by traction-engines; and some 4000 tons of ballast and other materials were conveyed in this way between May 4, 1905, and Feb. 6, 1906. Considerable damage was done to the roads by the engines and trucks continually passing and repassing over them; and on May 28, 1906, the Surveyor to the plaintiffs gave his Council a certificate showing that extraordinary expenses to the extent of £238 4s. had been incurred by them in repairing roads. The defence to the action was threefold. First, that the action was out of date, inasmuch as the proceedings were not commenced within twelve months of the time at which the damage was done, or not within six months after the completion of the contract or work, in accordance with the provisions of section 12, sub-section 1 (*b*) of the Locomotives Act, 1898. It was admitted that the work was a building contract, or work extending over a long period within the meaning of the sub-section; but it was contended that the work which actually caused the damage to the roads was completed on Feb. 6, 1906, and that this was the date from which the six months' limit was to be calculated. If this contention was correct, it would naturally follow that the defendants, if liable at all, would only be liable for any damage done to the roads since Nov. 1, 1905; and it was admitted that by far the greater part of the damage was done before this date. Secondly, it was contended that the damage done to the roads, and the excessive weight and extraordinary traffic passing along and upon them, was not caused by, or in consequence of, any order of theirs; and, thirdly, it was said that the amount claimed was excessive. In his judgment, the first and second contentions were not well founded. With regard to the first, the view he took of the sub-section was that the six months limited by the Act was six months from the time of the substantial completion of the contract or work the carrying out of which had caused the damage to the roads, and not from any particular incident of the work. This being his view, he found that the actual work to be done was not completed until the middle of May, 1906; and therefore the action was brought in time. With regard to the second contention, he found that the carrying of the ballast and other materials by traction-engines and trucks was a natural and usual way of conveying such large quantities of materials; and he held that this method was resorted to in consequence of the order given by the defendants to their Contractor to build the reservoir. They were therefore liable for the expenses incurred by the plaintiffs in repairing the roads in question, but only for those directly attributable to the damage done by the excessive weight and the extraordinary traffic on the roads caused by the traction-engines and trucks. He assessed these expenses at £163 13s., and he gave judgment for the plaintiffs for this amount, with costs. Execution was stayed in view of an appeal.

ELECTRIC LIGHT CHARGES OBJECTED TO BY THE GAS COMPANY IN MELBOURNE.

The Judicial Committee of the Privy Council (consisting of the Lord Chancellor, Lord Macnaghten, Lord Atkinson, Lord Collins, and Sir Arthur Wilson) recently heard the arguments in an appeal from a judgment of the High Court of Australia, reversing a decision of the Supreme Court of Victoria in an action by the Attorney-General of the State of Victoria, on the relation of the Metropolitan Gas Company, against the Corporation of the city, to restrain them from continuing to charge for electricity rates which were not uniform per unit. The matter has already been noticed in the "JOURNAL," and the facts were not in dispute. It was admitted that the Corporation supplied electricity under two different systems at rates appropriate to each, but not identical. Under the first, the quantity used was charged for at the rate of 4½d. per unit—the flat-rate. Under the second, a rate of 7d. per unit, known as the "maximum demand rate," was charged for such portion of the electricity supplied as was equal to a consumption, for a period of 45 hours per calendar month, at the highest rate of consumption during that month, and a rate of 2d. per unit for the remainder. Both rates were less than the maximum rate authorized by an Order made under the authority of the Electric Light and Power Act, 1896. It was admitted that it was optional with every customer, or intending customer, to choose the system under which he should be supplied; and that, as between the several customers under each system, no preference was given to one customer over the other, though under the operation of the second system different results worked out in the case of different customers, as must be the case where, as in this instance, the consumption was taken into consideration in fixing the price. It was contended on behalf of the plaintiff that the defendants' mode of carrying on their business was illegal; and that they could not have two different systems of supply, and were only entitled to charge one uniform rate for all electricity sold by them, irrespective of the quantity, or the time when, or the circumstances under which, it was supplied. The Supreme Court, considering that the case came within the principle of a previous decision in an action between the same parties, by which the defendants had been restrained from supplying electricity for heating or power purposes at a rate lower than that charged for lighting purposes, granted the injunction. On appeal to the High Court of Australia, the decision was reversed, and an order was made dismissing plaintiff's action with costs. From this decision the present appeal had, by special leave, been brought.

Mr. Danckwerts, K.C., and Mr. E. Morten appeared for the appellant; Sir Robert Finlay, K.C., and Mr. A. C. Nicoll represented the respondents.

The result of the decision of the Supreme Court was the passing of an Act in 1901, by the Legislature of Victoria, making it unlawful for any undertaker within the meaning of the Act of 1896 to charge for the supply of electricity used for power or heating purposes respectively, or both, a lower uniform rate than that charged for the supply of electricity employed for lighting purposes. In the appeal, it was contended, on behalf of the plaintiff, that terms of the statute of 1901 amounted to a declaration that, according to the true meaning of the Act of 1896, only one uniform rate could be charged by the defendants for the electricity supplied by them throughout their district. Section 13 provided that conditions and restrictions might be inserted in, or prescribed by, the Order in Council made under the Act with regard (*inter alia*) to "the limitation of the prices to be charged in respect of the supply of electricity." Section 38 was practically identical with the 19th section of the Electric Lighting Act, 1882; but section 39, dealing with preference, differed in its wording from section 20 of the Act, relating to the same subject. It had been held by Lord Justice Buckley that the words "a supply on the same terms," used in section 19 of the English Act, bore their natural meaning and included price. Mr. Danckwerts contended, however, that the same words, contained in the corresponding section (38) of the Victoria Act could not, by reason of the provisions of section 39, be held to include price. Lord Atkinson (who delivered the judgment) said that their Lordships could not concur in this view. They thought the "preference" prohibited in substance by it was a "preference" between customers dealing under similar circumstances, and not between customers dealing under two different systems of supply, either of which they were free to select, and therefore dealing under entirely different circumstances. This construction reconciled the two sections 38 and 39 one to the other, and made them consistent, did no violence to any of the provisions of either, did not impose on the defendants, as would the construction contended for on behalf of the plaintiff, most embarrassing restrictions in the conduct of their undertaking, and at the same time promoted rather than interfered with the interests of the consumers. Their Lordships were therefore of opinion that the decision of the High Court was right and should be affirmed, and the appeal dismissed, with costs.

Disputed Meter Registration.

At the Llandudno Police Court, on Monday last week, Mr. A. Conolly, the Clerk and Solicitor to the Urban District Council, sought to recover from Mr. W. T. Parker £5 16s., the balance of a claim for about £7 odd for gas supplied. It appeared that defendant used the gas for heating a hot-water urn and for a gas-stove; and the amount sued for was for the gas consumed in the Christmas quarter last year. On receiving the bill, Mr. Parker complained that it was excessive, and the meter was removed and tested. Three tests were made—two by the Meter Inspector and one by the Gas Manager (Mr. Walter Shadbolt). By the first test the meter was shown to be 3·9 per cent. fast; by the second, 2·56 per cent. fast; and by the last (the Gas Manager's test), 3·73 per cent. fast. On the basis of the last test, the Council offered to allow a rebate of 7s. 6d.; but Mr. Parker refused to accept it. Mr. J. E. Hallmark, for the defendant, said that since Mr. Parker took over the business in 1905 the average amount of the gas bill had not exceeded £3 per quarter; and he was naturally astonished when he received the demand for upwards of £7 for the Christmas quarter. For the month in this year which elapsed before the meter was changed, the gas cost £2 5s. 8d.; while for the two months of the Lady Day quarter which followed the change of meter, the cost was only £1 7s. 4d. It was obvious that the meter was seriously out of order, and that therefore the reading ought not to be accepted as evidence of the consumption. The Bench, however, made the order for the amount claimed, less the deduction of 7s. 6d.

Gas-Works for Santa Cruz.—It is stated in the "Engineer" that a concession has been granted by the Municipality of Santa Cruz to a merchant of Bremen to erect gas-works. The concession extends over a period of 75 years, and also gives the sole right of laying gas-pipes in the streets and of supplying private houses with gas for lighting and cooking purposes.

Gas-Works Profits at Stalybridge.—The Stalybridge Elective Auditors (Messrs. Gill and Tonge) have lately made their report on the finances of the Corporation. The profit realized on the gas undertaking was £2863; and the Auditors remark that this is "the most satisfactory item in the borough fund account." They add, however, that "it is more than absorbed by the precept required to be paid for the luxury and convenience of an electric car and lighting scheme."

Winding-Up the Pontefract Gas Company.—The Pontefract Gas-Works having been acquired by the Town Council, the Corporation have paid the amount of the purchase-money (£69,600), the half-year's interest to June 30 (£1292), the amount then due to the bankers (£1340), the costs of winding-up the Company, the bankers' commission, and the taxed costs of the arbitration. The Liquidator (Mr. Claude Leatham) has paid to the shareholders £20 in respect of each 10 per cent. £10 share, and £14 in respect of each 7 per cent. £10 share, and has informed the shareholders that there now remains in his hands £14,353, from which they might expect to receive approximately a further sum of £5 5s. 6d. per share on the 10 per cent., and £3 13s. 10d. on the 7 per cent. shares; making totals of £25 5s. 6d. and £17 13s. 10d. respectively for each £10 share. Resolutions for the winding-up of the undertaking on this basis have been passed; and the Company will be finally wound-up on the 1st prox., or as soon after as possible.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held last Wednesday, at the Cannon Street Hotel, E.C.—Sir GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Frank Bush) having read the notice convening the meeting, and the minutes of the last ordinary meeting, the seal of the Company was affixed to the register of proprietors, and the report and accounts for the six months ending June 30, which have already been given in the "JOURNAL," were taken as read.

A GOOD GATHERING—THE REPORT.

The CHAIRMAN: Ladies and gentlemen, I think the Board may take it as a high compliment to see such a gathering in August at our general meeting. It is very gratifying to us to see so many shareholders present. I have to move—"That the report and accounts now presented be received and adopted, and the report entered on the minutes." Well, there is a great deal of interest to us in the report; but whether it is so to the shareholders may be another matter. I am afraid this will be rather a lengthy meeting; and I hope I shall not exhaust your patience. In the first paragraph of the report, we give as much information as possible, feeling that the Company is the property of the shareholders, who have a right to know as much about it as the Directors are able to inform them within the limits of the report.

THE INCREASE IN THE PRICE OF GAS.

There are several important matters dealt with here; and the first, and one of the most serious—perhaps the most serious—is the increase in the price of gas. I dare say it will be asked why we have increased the price, while some other companies have not done so. Well, ladies and gentlemen, there are two policies in most things. Our policy has been to reduce the price always when we found it possible to do so. Whenever we have found ourselves with a surplus sufficient to warrant the reduction of price, we have reduced the price; and the consequence is that we have never accumulated a surplus to any extent. Therefore when adverse circumstances have arrived, such as a great increase in the cost of coal, we have no surplus profits to fall back upon, and an increase of price is inevitable. The other policy is to accumulate a considerable surplus of undivided profits carried forward from half-year to half-year, and then, when times like these arise, to use up these balances instead of increasing the price. It is just a question as to which is the better course. I think it must be more satisfactory to the consumers to feel that the gas is always supplied to them as cheaply as possible. I think another reason for the policy we adopt is that consumers, employees, and shareholders are all partners, whether in prosperity or adversity; and as they share in the advantages of prosperity, they ought to bear the brunt of adversity—all being in the same boat.

LARGE UNDIVIDED BALANCES.

For this reason I think the Board are justified in adhering to the policy that has been pursued from time immemorial, of not accumulating a large undivided balance, but letting the consumers have the advantage of a reduction as soon as we are able; and when times like these arise, explaining the matter fully to them, and the reason why we have increased the price. The circular we sent to the consumers explaining the reasons for the increase of price was a sort of invitation to them to comment on our action; but so far—and it is more than a month since the circular was distributed—no complaint has been made. In fact, those who have written have generally said: "We are satisfied with your reasons for the increase." But it may be said, "Surely there is an advantage in having a certain amount of money in reserve." Well, though we have never tried to get a large balance in the profit and loss account to carry forward, we have, by self-denial, out of dividends built up a very respectable reserve fund, which now amounts nominally to £181,000. It is not, however, quite equal to that, because stocks have depreciated. The fund has remained untouched for many years, and is likely to remain untouched, for it will only be used to meet some unexpected and unavoidable loss, and not an increased cost of coal. We can wait until there is a turn in the value of securities. Then we have another fund—the insurance fund, in order to meet any extraordinary accident for which we could not make provision. This amounts to £108,000. So that we have nearly £300,000 of reserves, though we have only £505 as a balance to carry forward. Now, in our report we explain the position; we point out how it is that the three interested parties are partners in profits and losses. If adverse circumstances arise, we increase the price of gas. This takes something from the consumers. It also takes a considerable sum from the shareholders, and it takes about £10,000 a year from the employees. Now, when all the interested parties feel that they share as nearly as possible fairly—for one cannot compare the shareholder with the consumer exactly, or the employee, but when they feel that they share fairly in gains and losses—all three parties are likely to be content. We reduced the price three years ago (at Midsummer, 1904); and from that time the shareholders were entitled to £5 14s. 8d. per cent. dividend. We have not earned it in these three years, and we have not paid it. We have only paid the 5½ per cent. which we had been paying to the shareholders—they having foregone the 4s. 8d. per cent., or £15,700 a year. The increase of price will reduce the dividend payable from £5 14s 8d. to £5 6s. 8d. But seeing that the shareholders have only had 5½ per cent., the actual reduction to them will be 3s. 4d. per cent. instead of 8s.; and instead of being £25,700 a year, the reduction will only be about £10,000. I think the shareholders may well have contended that, while the consumers and employees have had their full benefit, the shareholders did not get theirs; but it is a proud satisfaction to us to feel that the shareholders never have complained. It is often remarked about shareholders that they have one sordid object, and one only, in view; and that is to get the highest possible dividend regardless of all other considerations. But it is a very happy thing for us to be able to say here at these meetings that the shareholders of this Company have never shown anything of the sordid spirit whatever; they have always been ready to look at matters in a liberal and fair spirit. I do feel this, however, that when we are able to reduce the price again the time has come when the shareholders should have their full benefit whatever it may be. At any rate, when we reduce the price 1d., which I hope we shall do before very long—I hope it will not be much more than a year, at any rate—then the 5½ per cent. will be restored. Now, it seems to us that this system of ours—a partnership of shareholders, employees, and customers—is ideal.

GAS NO LONGER A MONOPOLY.

At one time gas companies had an absolute monopoly of the supply of artificial light; but we have not that now, though we have a monopoly of the supply of gas. There is a great amount of public feeling against monopolies, and a good deal of that is reflected on gas companies. The public say: "You are a monopoly; you do just as you like; you charge what you please." Well, competition is the alternative to a monopoly. Now, competition in the supply of gas is an impossibility. Parliament settled that forty years ago; and it is impossible to re-open it. The practical difficulties are sufficient to bar that. Then where are we? There is no competition; there is a monopoly. How are the public to be protected? By making it to the interest of the shareholders and employees to do the best they can for the public; and then you get benefit equivalent to competition. Competition is life; without competition there would be stagnation. What is wanted is that we should have a sufficient motive to do our best; and the application of the sliding-scale ensures that for the supply of gas to the public. It makes it to our interest to do all we can to serve the public well; and I think in the future we must see that the shareholders get their full rights. Well, then, the employees are in the same boat. It is to their interest also to serve the shareholders and the consumers well. If we can reduce the price, both dividend and bonus go up. Now that, as we say in the report, is an ideal system.

THE COAL MARKET AND THE COAL-TAX.

I come now to the second paragraph, and ask you to compare ours with the coal trade. In the coal trade there are two parties interested—the coal owners and the coal miners. But where are the consumers, the users of coal? The coal owners, and the coal miners too, pressed the Government very hard a year or two ago for a repeal of the duty on exported coal, which they said came out of their pockets. They do not say so now; and I will just state the facts with regard to the coal that was exported. When it paid a duty, sometimes the coal merchant or the coal owner undertook to supply the coal for a foreign port. There is a phrase in use, "c.i.f." (coals, insurance, freight), which is an inclusive phrase. The shipper said: "We will deliver coal, say, in Bordeaux c.i.f. at a certain inclusive price." When the tax was on, it came to be c.i.f.t. (coals, insurance, freight, tax); and when the coal owners undertook to deliver coal abroad, they put the 1s. tax—they have told me so themselves—on the price of coals to be sold abroad. When I was speaking about it to the Chairman of a foreign Gas Company (who is a large buyer of coal), he said he bought the coal free on board; but before he could take the coal out of the country, before the ship could be cleared, he had to pay the tax for the coal going to France. So, in abolishing the duty, I can not see that any benefit whatever has been conferred on the British nation. It has increased the cost of coal no doubt; it has increased the foreign demand; but I never could understand why Mr. Asquith took off the duty. A little light was thrown upon it the other day. I have cut this out of the "Daily Chronicle," dated July 31. There was a debate on the Finance Bill, and the Chancellor of the Exchequer was called to account for not having reduced taxation. In his defence he said that "when people said the Government had done nothing to reduce taxation, he would remind them that last year he remitted the coal-tax." He reduced taxation to the foreigner; but I do not see how thereby he reduced taxation to the Britisher. "He would remind them that last year he remitted the coal-tax at a cost of £2,000,000; and this year the tax would have produced something like £2,500,000." Then he says he has taken 1d. off tea and some other things; but to put in the remission of the coal duty as reduction of taxation is an enigma to me. I have been very much found fault with for what I have said about this matter. A reporter came to see me one day, and I said something to the effect that, instead of taking the duty off, it would have been better to have increased it to 2s. per ton, and so have got £4,000,000 instead of £2,000,000. Some of the papers took this up, and said what nonsense it was for me to talk like that, and to say that the duty would by this time have produced £4,000,000 when the increase was only £500,000. What I said was that the duty should have been raised to 2s.; and I must say, speaking broadly and generally, it seems to me a suicidal thing for England to deplete itself of its coal, its capital. When coal is gone, England is done for; and as coal gets higher in price, so it makes it harder for everybody in England to live.

MINERS' EIGHT HOURS BILL.

The Government are now contemplating introducing an Eight Hours Bill to compulsorily reduce the hours of labour in mines to eight hours a day from bank to bank—that is, about six-and-a-half hours' work. Now if these coal miners were a down-trodden set of men who could not help themselves—helpless and hopeless, one might say—Parliament might do something for them. But they are not. There is no more powerful body in the kingdom than the coal miners, I suppose, as a body of working men; but there is just one thing that saves the public—there is a division among them. The Federation of Miners, controlling practically all England, Scotland, and Wales (except Durham and Northumberland), want the Eight Hours Bill. But the Durham and Northumberland miners do not want it; and if this Bill is passed, there will be no division between these two strong, powerful bodies of miners. I do not say the coal owners wish to combine with the miners; but there is no doubt they will be forced to, in their own interests, if this Eight Hours Bill is passed. It will tend very much to produce a union between coal miners and coal owners; and the interests of the country will be left out in the cold. I wish to draw special attention to this second paragraph: "Parliament also introduces Eight Hour Bills,

which, if passed, will increase the cost of getting coal, while the interest of the consumer of coal, which means every individual in the country, is ignored and forgotten. In this matter the interest of the consumer of coal, be he a manufacturer or a railway, water, gas, or electrical company, or the domestic user, is paramount. If the users of coal—that is, everybody, forgetting that everybody's business is nobody's business—do not press their claims on Parliament in opposition to the efforts of interested parties and faddists, the position is in great danger of going by default." Well, we make our protest; and if people allow Parliament to do it, the people must suffer.

LARGE INCREASE OF CONSUMERS.

I have nothing to say about the accounts. They are satisfactory. Last half year there was a deficiency of £9000 odd. I told you we should make it up in the June half year, which is always better than the December half; and on the whole the accounts are more satisfactory than we expected. There has been a large increase in the number of consumers. Slot-meter consumers have increased. They were 198,080 in June of last year, and now they number 212,945—an increase of nearly 14,000. But of these slot-meter consumers, 3791 were ordinary meter consumers, who have changed to the slots. Otherwise it would appear that our ordinary business is not progressing. Last year we had 102,169 ordinary meters; and this year the number is only 100,767—that is, 1400 less; but 3800 have changed from one to the other. It means a gain of 2400 ordinary consumers and about 10,200 slot-meter consumers. Well, this shows that the business is going on; and I think we are now beginning to see, if not the end, to see our way out of the loss of consumption resulting from the change from ordinary burners to incandescent mantles. We are now beginning to get a little increase again; but for several years we have had practically little or no increase. The increase is not much, it is true. Still, it is nearly 2½ per cent.; and I think we may look forward to a return to something like our normal increases when the incandescent mantle has done its work.

THE RATING APPEAL.

I have only a word or two to say about rating, because really it is not a thing that affects the shareholders to any serious extent. We have tried to get a fair system, and to get rating put on a fair basis, but so far have failed. The system is as unsatisfactory as anything could be. We say here: "The system of rating gas companies could not be more unsatisfactory, confusing to the last degree, understood by no one, and perhaps least of all by the Courts of Quarter Sessions who hear the appeals." I think gas companies would do well to take action themselves—it might be started in London in the first instance—to promote a Bill in Parliament for the rating of gas companies on a fair, clear, and understandable principle. Of course, such a Bill might not be passed; but, at all events, it would open the subject and show the necessity of something being done. But as to the shareholders it is a matter of perfect indifference. The rating we pay is over £80,000 a year. I think that is about half as much again as it ought to be fairly. Supposing then that there is £26,000 or £27,000 excess in the rating, that would amount to about ¼d. per 1000 cubic feet. If we could save this £26,000, the price of gas might be reduced ¼d. per 1000 feet were it practicable to reduce by halfpennies, and the consumers would save £26,000 a year. What would the shareholders get? They would get about 1s. 4d. per cent. additional dividend, that is all. So that supposing we are paying £26,000 a year too much in rates, if that were saved it would only affect the dividend to the extent of 1s. 4d. per cent. per annum. But we never divide such small amounts. It comes to this, that the burden is borne by the consumers, who are also ratepayers. We have done our best in this rating matter to protect the consumers, and to prevent gas being unduly charged for. I am sorry to say that the two necessaries of life—water, which is the most important of all, and gas, which is also very important—pay very much more in rates than any other article of consumption, simply, I believe, because the system of rating is so unfair. But it does not matter to the shareholders. I now come to the last paragraph of the report, which is a very satisfactory one. We say: "If the Company's position is, to an extent, war without, it is peace within. The consumers are well disposed towards the Company, and the employees of all ranks are loyal and interested in its welfare. Of course, in both, there are here and there exceptions. But, speaking generally, the relations are very satisfactory." It is a great satisfaction to the Directors—and to the officers and workmen, too, because they hear more of it—to find that the consumers regard us as men who wish to deal fairly and considerately, and can feel that they are safe in our hands. Then as to the employees of all ranks, they are loyal and interested in the welfare of the Company; and as to any difficulties, I think that is an impossibility. The other day I came across a presidential address by Professor Merivale to the North of England Institute of Mechanical Engineers. After speaking of the Conciliation Boards and the sliding-scale, he spoke of the further stage which is to be reached when the identity of the interests of capital and labour will be recognized by everybody, as it now is by the few, and disputes between capital and labour will be impossible. Well we are among the few who have recognized the identity of the interests of capital and labour. The shareholders of this Company have behaved very nobly in the matter, and have always, when this question has come up, shown sympathy with the workman and the labourer, and have supported the Board in all their proposals for the promotion of "a righteous peace in the industrial world," as it is described by President Roosevelt. We are to-day bringing before you a proposal for the alteration of our Workmen Directors scheme; and I will therefore defer any further remarks on the subject until we come to the special meeting. I will conclude this rather drawn-out speech by proposing the motion which I have read.

Mr. ROBERT MORTON seconded the resolution.

Dr. DRYSDALE asked whether the amount of gas produced per ton was stationary, or whether it had increased?

The CHAIRMAN: It has rather gone back, because we have had to buy different coal. It has gone back about 100 cubic feet per ton; the figure being now 10,838 feet, instead of 10,956 feet.

A SHAREHOLDER asked as to the monazite sand suspense account being some £10,000 less.

The CHAIRMAN: We have paid that off and got rid of it.

A SHAREHOLDER asked how and where the £181,000 of the reserve fund was invested.

Sir FORTESCUE FLANNERY was sure he would be expressing the general feeling of the shareholders in offering the congratulations of the Company generally to the Directors upon the position they had put before the meeting. There was, of course, the drawback of the increased price of gas; but if the Board desired any expression from the shareholders side of the table upon the alternative policies of charging a high price for gas when coal was not so dear, and so accumulating a large fund, and making only small profits from the gas and leaving it to consumers and employees and the gas workers to share adversity with the shareholders' when the pinch should come, he had no hesitation in saying that the general feeling of the shareholders was to support the policy of the Board. One of the great arguments against the co-partnership idea—joining the workers with the shareholders—had been that the workers would hesitate to share adversity, although they would very gladly share prosperity. But the experience of this Company had proved the contrary. He considered it an excellent training both for shareholders and their co-partners to feel that, when adversity, if in a mild form, should come, they were partners in that as well as in prosperity; and that very fact would, he believed, tend largely to keep them together and maintain the excellent system which had been established. It was matter for congratulation that something near 5 per cent. had been added to the number of consumers. The great foundation for the prosperity of the Company was in having a large number of consumers; and, personally, he wonld rather see a large number of small consumers than a small number of large ones taking the same amount of gas. The Chairman had kept back the heaviest shot in the locker for the special meeting; and with regard to the co-partnership scheme, he thought it matter of great congratulation that they should have reached this special milestone upon the road to civilization. The peculiarity of previous schemes was that they would expire automatically by the effluxion of time; but the scheme to which the shareholders would, he was sure, presently give unanimous support would automatically continue until it should be found wanting. On behalf of the shareholders, he wished to express satisfaction with the report, thank the Chairman for his clear and lucid speech, and express the intentions of the shareholders to give him their support, they hoped for many years to come, in the good work he was doing.

The CHAIRMAN, in reply to the question as to the investment of the reserve fund, said the whole of the money was not invested; a certain proportion being held for working capital. But over £100,000 was invested in first-class securities—debentures, preferences, corporation stocks, and so on. These securities did not, however, stand to-day at the value they cost; having depreciated by about £11,000. Taking this £11,000 from the £181,000, the nominal amount of the reserve fund, they had £170,000 available in hard money.

The resolution was carried unanimously.

The DEPUTY-CHAIRMAN (Mr. Simpson Rostron) moved: "That a dividend at the rate of five and one-half per cent. per annum be now declared, and that the warrants be transmitted to the registered addresses of the proprietors by post." It was a great advantage that they had two audits in all Metropolitan gas accounts, as used to be the case with the Water Companies before they were all absorbed. The accounts underwent not only the supervision of their own Auditor but of a Government Auditor appointed by the Board of Trade, whose duty it was to see that all amounts properly chargeable to revenue were noted before the amount of profit out of which the dividends were payable was ascertained. The double audit provided for the security of their dividend. The shareholders might be interested to know that, according to a table drawn up by the Secretary, 5½ per cent. was the exact average of the last 21 dividends, beginning in June, 1897, and including the present one; and that was the dividend which, under the operation of the sliding-scale, the shareholders would receive next March. The table began with 5¼ per cent., and then went up to 5½ per cent. Then, in 1900-01, for two half years the Board were obliged to reduce the dividend more than on the present occasion; and it then fell to 5 per cent. For the last three-and-a-half years, they had enjoyed 5½ per cent. The cause of the reduction in 1900 was the same as now—namely, a boom in coal, which had been very largely influenced by the expansion of the export trade following the remission of the 1s. per ton duty. As the Chairman had told them, this was a very serious matter not only for this Company but for all gas companies, and also other industrial undertakings. In order to give them some idea, he had taken out the figures of the Board of Trade returns from the "Economist" of Saturday last; and shareholders would be astonished at their dimensions. For July there was a total increase of revenue from raw material amounting to £1,196,000, of which no less than 94 per cent., or £1,131,000, was from the coal exported; the total quantity being 6,098,000 tons. The amount for the whole seven months of the year was 35,747,000 tons, of the estimated value of £21,758,000. Well, these were gigantic figures; and how far it was wise to allow such enormously increasing drafts on what might be called the mineral capital of the country, without any regulation or supervision such as a small duty would impose, it was not for him to decide. But it was a very serious question, and well worth the attention of every man. These figures would give an idea of the enormous loss of revenue which had followed the remission of the coal-duty. The people who got the benefit of the expansion of the export trade were the coal owners and the miners. The question then arose: How long will it last? That was impossible for anybody to say; but he hoped it would only be for a short time. He ventured to hope also that some good result would come out of it, as resulted from the coal famine of 1873, when Mr. Forster's Committee adopted the sliding-scale which had brought about the prosperity of the great gas companies.

Mr. CHARLES T. DRUMGOLD seconded the resolution, which was carried unanimously.

Extraordinary Meeting.

The CHAIRMAN: Now, ladies and gentlemen, I will proceed with this further matter. In the last paragraph of the report it is said: "The partnership in management by the Employee Directors, after nine years' experience, has answered the most sanguine expectations. The first scheme was for three years and the second for nine years; but the Directors now think it desirable to make the system permanent." This was what we said in the report; but since the report was printed,

an overlooked paragraph in the Act of Parliament authorizing the election of Employee Directors rather prohibits permanency. It says: "On the cesser of such scheme, and subject to the provisions of this Act, and to the like submission, adoption, and approval, a new scheme may at any time be adopted for any period that may be in that scheme prescribed and so from time to time." Therefore we propose in our scheme to settle it subject to certain conditions up to 1950. This is far enough to look ahead; if it is not a success by that time, it never will be. I hope a good many others will have followed our example by that time. This is so far as the correction of the report is concerned. I will now proceed to tell you about this scheme. When we promote a Bill in Parliament we do not send a copy of the proposed Bill to every shareholder, but the heads of it are read at the meeting; and I now propose to read the heads of this scheme. The first page of it gives an extract from the Act of Parliament authorizing it. By that we are bound as to it being for a period, and some other matters, the qualification and the fees, and one thing and another; and then we go on: "And whereas in 1898 the total investments of the employees in the ordinary stock of the Company amounted to £55,000 nominal, and a scheme for the election of three Employee Directors for a period of three years was adopted; but only two workmen were elected, the salaried officials not exercising their option." This is merely historical. Then in the next paragraph: "And whereas in 1901 the total investments of the employees in the ordinary stock of the Company amounted to £89,000 nominal, and a similar scheme for nine years was adopted, with power to determine it by the shareholders in 1904 and 1907, and one clerk and two workmen Directors were elected; and the working having proved in every way satisfactory, it was in 1907 considered desirable to supersede the scheme of 1901 by one for a very much longer period." The remark about this is: Why do we want to supersede the scheme that is now running from 1901 to 1910? We have been going on with this for nine years altogether. The first scheme was for three years, and the second for nine years, of which six have expired; and to tell you the truth one reason is a little bit personal. I should like to see this thing settled definitely, and my colleagues are all of the same mind. "And whereas the total investments of the employees in the ordinary stock of the Company now exceed the nominal amount of £200,000." The £200,000 nominal is over £240,000 actual market value. We were allowed to have Employee Directors when their investments amounted to £40,000. We did not appoint them until the investments amounted to £55,000 nominal. When the scheme was first renewed, they were £89,000; and now they are over £200,000. Now I come to the clauses of the scheme. "This scheme, which repeals and supersedes the scheme of 1901, shall come into operation as soon as it has been adopted by the shareholders of the Company in manner provided by the South Metropolitan Gas Act, 1896, and approved by the Board of Trade, and shall continue in force until 1950, or short of that year, so long as the shareholders approve (see section 14), and the aggregate investment of the employees in the stock of the Company shall not fall below the nominal amount or amounts set forth in section 4." We think it would not be a wise thing to fix the Company absolutely to this system. Although we have every confidence that it is right, still it is not a wise thing to bind or tie ourselves absolutely to anything that is new. Then we come to section 4, which deals with the aggregate holding of stock. The nominal amount of paid-up ordinary stock of the Company is £6,430,000, and the employees own over £200,000 or thereabouts, or a 1-32nd part—the other shareholders holding 31-32nds. The holders of the vastly greater proportion of the stock elect seven Directors; and under this scheme power is given to elect three Employee Directors. Well, this is a very much larger proportion; but we first adopted the scheme when they had only £40,000 stock, to enable the employees as soon as possible to share in the responsibility of the management, as they were sharing in the profits. We are trying to better distribute wealth among employees. With the distribution of wealth there must be a sharing of responsibility, or there is no proper sharing at all; and so we introduced a Workman Director scheme as soon as possible, in order to educate the workman in the responsibility of managing a commercial business. Then we say: "The essence of the co-partnership is that the employees' holding of stock shall increase year by year by the investment of their co-partnership bonus." It has increased year by year to £200,000; and every year it increases largely. Supposing the employees should lose confidence in the Company, and, instead of investing their money in the Company, should sell out that which they hold. That is going back; and if they cease to invest their property in the Company they will cease to have the right of representation. So we make this provision, that "If at any time the aggregate investment of the employees should fall back by 10 per cent. of its amount below any figure it may have attained less than one-tenth part of the paid-up capital, the number of Employee Directors shall be reduced to two by lot. If the reduction should amount to 20 per cent., the number of Employee Directors shall be reduced to one by lot." If they come down from £250,000 to £200,000, then they lose two Employee Directors. Then we say: "A reduction of 30 per cent. shall disqualify the remaining Employee Director, and then only as provided in section 14 can the Employee Directors be restored." We have considered this fully with the Employee Directors; and I am glad to say that they think this a fair and reasonable thing. So long as the employees continue to increase their investments in the Company, so long do we say that they are entitled to, and should share in, the responsibility of management; and when they cease to have confidence in the Company, and reduce their holding, then they have no right to have anything to do with the responsibility of management. So that it is an automatic sort of arrangement. But we do not think it will happen that the employee will lose confidence in the concern. Then we make this further proviso, that: "So long as the aggregate holding exceeds one-tenth part of the ordinary nominal capital, the above provisions as to reductions shall not apply." As the amount of the capital is £6,430,000, when the employees hold £643,000 and upwards, we say they have more than one-tenth of the capital, and are entitled to have Employee Directors anyhow. It is only when the holding falls below this that these provisions will apply. As to the qualification of an Employee Director, the Act says he must have a holding of not less than £100, and have been in the service not less than seven years. We say now: "Having been continuously not less than fourteen years in, and continuing in, the employ of the Company"; and the having held for not less than twelve months prior to the date of election, and the continuing to hold, not less than £120 in the stock of the Company. We have raised the qualification from £100 to £120; and we have provided for a further increase. When the aggregate holding is £200,000, the qualification is to be £120 of stock; and the fee £1 2s. 6d. per attendance When the aggregate holding is £300,000, the qualification is to rise to £140; when it is £400,000, the qualification is to be £160; when it is £500,000, £180; and when it is one-tenth of the capital of the Company, £200 is to be the qualification. The fees are to rise in proportion until they amount to the maximum allowed by the Act, which is not exceeding what an employee would have earned at his regular work in four days. The nomination of candidates, and the voting, not by ballot, are all details which need not occupy our time. One Employee Director is to retire every year, and is eligible for re-election. Those elected in 1898 are still on the Board—the workmen have re-elected their men every year, year by year. They say: "We are satisfied with the men we have got; we have got very good men, and we stick to them." Then there is power to the shareholders to terminate the scheme. "This scheme shall continue in force, subject to the limitations in section 2 [that is, to 1950] so long as, in the opinion of the shareholders, it answers its purpose of promoting a true union of employers and employed." If it does not fulfil that purpose it is a failure; and the sooner it is got rid of the better. Therefore this provision is inserted in the scheme giving the shareholders power to terminate it if it should fail to answer the purpose of promoting the true union of employers and employed. The procedure will be this: it is not to be a hasty action. At the February meeting in any year, if the Directors are satisfied that the thing is not answering its purpose, they can give notice that at the next meeting they will propose a motion for the abolition of the scheme; and if the shareholders at the August meeting approve, the scheme will come to an end within a year. The details may be varied from time to time. This is an important matter. It is committing you to a definite action on this great question of allowing employees to take a share in the management of the business in which they work. In the case of this Company and in that of the South Suburban Company (who have had a similar scheme for three years and have now renewed it till 1950), the workmen have certainly selected, I think I may say, the best men they could have found qualified at the time to represent them. These gentlemen have sat on the Board with us now for nine years, and have in every way acted fairly, reasonably, and sensibly. They have not taken any light view of their duties. They have looked at the interests of the Company as a whole—shareholders, consumers, and employees have all been considered; and the Directors are in every way satisfied with the experiment so far as it has gone. One of our colleagues, Mr. John Ewart, is, unfortunately, absent. He was opposed to the scheme nine years ago; but he seconded its renewal six years back, and he regrets that he cannot be here to-day, for if he had been he would have seconded it on this occasion. You are doing something more then for this Company. You are taking a step for the securing President Roosevelt's "righteous peace in the industrial world." If that righteous peace can be established there is no doubt whatever that the British nation will be in a far better position than it now occupies. What is really wanted by this great industrial nation is to bring the two wings of the industrial army into line, working together. At present they are very much like the sport known as Tug of War—both pulling in opposite directions and trying to pull each other over. This is what is being done in Belfast. That is what has come of the Trades Disputes Bill for peaceful picketing, which was the beginning of the trouble. I do not say that every man is loyal and devoted; some of them we know are rather taken in by the Socialist talk which is so common. They are told they do not have their proper share of what they produce. I read in a local South London paper the other day that of every 1s. 6d. the workmen produces he only gets 4½d., and nonsense of that sort, which working men sometimes believe. There are some of them, I know, who are rather taken with these Socialistic notions; but they are a very small minority, and it would be utterly impossible for them to do us any harm whatever. We have got very far beyond that; and now we ask you to put the final seal to the work, and instead of this Employee Director system being a temporary matter, subject to lapsing after a short period of three years or nine years, or whatever it may be, to make it a fixture, subject to the above-named conditions, until the year 1950. I move: "That the scheme now submitted to this meeting for the election of Employee Directors, made under the provisions of the South Metropolitan Gas Act, 1896, and the South Metropolitan Gas Act, 1897, be approved and adopted, subject to such alterations as the Board of Trade may suggest, and the Directors agree to."

The DEPUTY-CHAIRMAN, in seconding the motion, said that, in the presence of his Workmen-Director colleagues, he would not be so impertinent as to praise them; but at the same time he might tell the shareholders that they had a breadth of view and a grasp of any question that came up for consideration at the Board. The shareholders' interests were as well looked after by the Employee Directors as by the Chairman or any other member of the Board. In his experience, the scheme had worked very well. It had promoted good feeling, not only among the Directors but among the workmen generally. It was part and parcel of the bonus partnership system; and with regard to that, they would perhaps like to have one or two figures which Mr. Bush had turned up. During the last 16 years, the average payment on the bonus system was £19,000. Sometimes, of course, it was much more; sometimes it had been very much less. It looked a huge sum; but he would point out that during that period the sales of gas had increased by 1333 feet per ton of coal carbonized, and the carbonizing wages had also much decreased. He would only mention one other thing, and that was that they might on suitable occasion do good to the Company, and to the interests of capital and labour, by recommending this scheme. He had on several occasions recounted his experience of it; and he found that people were very much interested in it, and considered the scheme very much better than they thought it was.

Rev. CANON CROMWELL, as one who did not belong to the laity, but as a clergyman who had devoted many years of his life to the study of

co-partnership, desired to support the scheme. He thought the plan was the surest and safest way to the permanent prosperity of the Company. He was glad that masters and workmen could now see eye to eye; and that being so, the Company need not fear foreign competition. They had been told that the real cause of a smaller dividend being paid was owing chiefly to the high price of coal and the heavy increase in rates; and as they were all householders, and therefore interested in these two questions, he wished to point out that it was Parliament who had increased the price of coal, and borough councils who had increased the rates. Then arose the question whether each one in his own sphere could do anything to improve this state of things? His answer was "Yes, study the character of the men you send to Parliament, and of those you place on the councils." He was aware that a large portion of the British population took pride in not mingling in politics; but he thought this was a mistake. His advice was "Look to Parliament and to your Councils."

Mr. GEORGE HOWLETT thought the scheme was a liberal one and well worthy of support. He did not believe there were many in this country who would listen for any time to Socialistic notions. Socialism was no new thing. On one occasion, when in Leeds, he heard two men who were on their way to a meeting discussing the subject. One asked the other how much per man there would be when all the wealth of the country was shared out, and, being told that it would be about £124, said: "Then I am going home; I shall have nothing to do with it, as I have £136 at the bank now." He believed that was the feeling that was running through all the employees of this Company.

The resolution was passed unanimously.

Dr. DRYSDALE proposed a hearty vote of thanks to the Chairman and Directors for their able management of the Company's affairs.

Mrs. ALICE VICKERY seconded the motion, which was carried unanimously.

The CHAIRMAN: I think this is the first time the vote has been seconded by a lady; and the Board appreciate it all the more on that account. I have simply to thank you for your kind vote; it is not a formal thing, and for that reason we value it all the more. I now beg to propose a hearty vote of thanks to the officers. Mr. Carpenter, the head of the engineering department, I think will tell you that he has been very ably supported by the men under him; and we have the greatest satisfaction in feeling that Mr. Carpenter is our Engineer. Then we have Mr. Bush, the head of the clerical and collection department, of whom I can speak quite as highly as of Mr. Carpenter. I am sorry to say that Mr. Bush has had a serious illness; but I am thankful that he has now recovered. We do not want anything to happen to him. The difficulty is to get him to take sufficient holiday. However, we are glad to have him among us to-day.

Mr. H. T. AUSTIN said he had great pleasure in seconding the motion. Having to work under Mr. Carpenter, he could bear testimony to his merit, and to the fact that the Company had efficient engineers at the various stations. The men co-operated well with the engineers, and rendered as far as they could faithful service for the benefit of the Company.

The resolution passed unanimously.

Mr. CHARLES CARPENTER, in returning thanks, said in every department, from the highest to the lowest, he had always been ably supported. He might refer to a point which had been raised by one speaker, from which it might be inferred they had reached high-water mark in the make of gas. It was not that their plant was less efficient, or not so well looked after, but the class of coal handled had been different. During the half year they had carbonized between 50 and 60 per cent. of Yorkshire coal instead of Durham; but the difference in the make of gas per ton of coal carbonized, compared with the high-water mark, was only 1 per cent. He thought this fact spoke volumes for the carbonizing staff.

Mr. FRANK BUSH desired to thank them most heartily for the vote of thanks which had been passed to the staff, and also for the kind remarks made about himself. He hoped that in the course of a week or two he should be fully restored to health; for, if he could help it, he did not intend to be a valetudinarian. Allusion had been made to the fact that the employees were partners in adversity as well as in prosperity, and that by the increase in the price of gas the bonus would be reduced. But there was another aspect to the question. The employees had upwards of £200,000 of stock, which was bought for them by trustees; and it might interest the shareholders to know the price paid for the stock during the last five years. In 1902, the price paid was 123; in 1903, 121½; in 1904, 123; in 1905, 131; and in 1906, 131. He again thanked them for the hearty vote of thanks which had been accorded to the staff.

COMMERCIAL GAS COMPANY.

The Ordinary Half-Yearly Meeting of the Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. BRADSHAW in the chair.

The SECRETARY (Mr. H. D. Ellis) read the notice convening the meeting.

In signing the register of stockholders, the CHAIRMAN observed that some 300 more stockholders would be shortly joining the Company. These would be employees who had become entitled to £5 worth of stock, by reason of the profit-sharing scheme. It was very gratifying to know they were becoming proprietors.

THE PRICES OF COAL AND OIL AND OF GAS.

The Directors' report and accounts having been taken as read,

The CHAIRMAN said it was his privilege to move their adoption. The accounts the Directors were submitting that day bore upon them some indication of the large rise in the price of coal and of oil which had taken place, although only rather less than one-third of the coal used during the half year had been purchased at the higher price. Since the Directors met the proprietors in February last, the new contracts for the year ending April 30 next had been made; and, as he foreshadowed in February, they were at a considerably augmented price. The rise in the price of coal was due in some part to the somewhat abnormal activity in the industries of the country, and in part to the removal of the export duty which had certainly fostered the demand from abroad, if it did not create it. The price of oil had, as usual in some measure, followed the price of coal; but the increase had been much aggravated by the heavier charges for freight from America. Fortunately, during the last twenty years, they had become accustomed to the fluctuations in the price of raw materials; and for some time past, they had been making preparations to meet it by building up their undivided profit from half year to half year. He was glad to think, they had a substantial sum, which was available to keep down the price of gas, and to maintain the dividend. As to the future, no apprehension whatever need be felt as to the position of the Company. The demand for new supplies continued to be brisk; business was very good; and the increase in its volume was satisfactory. But at the same time, the Directors deplored having had to raise the price of gas. For the present, they thought 1d. per 1000 cubic feet increase in the price—from 2s. 5d. to 2s. 6d.—was sufficient; and they meant to strain every nerve to avoid a further increase. If success attended their endeavours, he did not think any of the co-partners in the scheme would really feel the advance. The consumers' bills would only increase by a very small amount; their profit-sharers would suffer the loss of some £530, which represented ½ per cent. on their bonuses; while the proprietors would be still entitled to the same dividend, because for some time past they had voluntarily foregone a small portion of the dividend which, under the Acts of Parliament, they might have paid. But he was bound to say that 1d. per 1000 cubic feet in the price of gas only represented £12,800 per annum; and it was altogether insufficient to meet the heavier charge for coal and oil. To make up the additional cost, they would have to look to the increase in their business, to better prices for residuals, and to greater economy and efficiency in their working. What these failed to produce, they would have to take from the undivided profit carried forward. If all these sources failed them, or proved to be insufficient, or if the higher price of coal was long maintained, then he feared there would be no alternative but to again raise the price of gas; but the Directors would never forget that it was in the interests of all parties to keep the price of gas as low as possible.

HOW OTHER COMPANIES HAD FARED.

The proprietors (or those of them who did not already know) might be interested to hear how the other Metropolitan Gas Companies had fared. The South Metropolitan Company had had to advance their price by 3d. per 1000 cubic feet—from 2s. to 2s. 3d. The Gaslight and Coke Company had met the situation by re-imposing meter-rents, which they relinquished some years ago; and as they had a very large sum of undivided profit, they hoped to get through the twelvemonth without increasing the price of gas. All who were interested in the gas industry were pleased to see the prosperity of the premier Company; and he was sure they heartily congratulated the Directors and executive officers generally on the position and prospects of the concern, which must be attributed in no small degree to the energy and wisdom of their management.

THE BOARD'S POLICY.

While on the subject of coal, he should like to say that the Board had purchased only the best Durham coals, because their experience had taught them in the past, when they had sometimes bought small parcels of inferior coals, that they were more expensive in the long run, though they could at the moment be bought at a lower price. Their policy had also been based on the consideration that the Yorkshire ports might become congested, and that the Company would suffer loss through the detention of their steamers; and they had felt that perhaps just when the demand for gas was the heaviest, they might not be able to obtain the supply they needed. He thought the policy of the Board was correct, because he read in the daily papers that, even in the height of the summer, when the demand was the lowest, steamers had been kept waiting outside the ports unable to enter to load their cargoes.

"COALITE!"

The half year with which they were dealing had seen the long-expected advent of the Company which was going to mitigate London fogs by introducing a new smokeless fuel, which had been called "Coalite." He supposed they were all agreed that any invention that would do something to lessen the volume of black smoke which now defiled the atmosphere of London was to be heartily welcomed. But the Gas Companies had been making considerable progress in this direction for many years past by introducing gas-fires for cooking and heating. The users of gas-fires at the present time were getting their cooking and heating done at a small increase in price compared with the heavy charges now being made for household coals. With regard to "Coalite," there was very little difference between this material and what gas companies called coke. Coke was manufactured by carbonizing coal in clay retorts for six hours at a temperature of 1800° Fahr.; and from the coal was taken some 10,000 to 11,000 cubic feet of gas per ton of an illuminating power of 14 candles. Coalite, on the other hand, was produced by carbonizing coal in iron boxes for eight hours at a temperature of 800° Fahr., extracting from the coal only some 5000 or 6000 cubic feet of gas per ton, of an illuminating power of something like 20 candles. They had purchased some "Coalite," and had experimented with it. He must say that it gave a bright, attractive looking fire without any appreciable smoke; but from what he had seen, and from what he had heard, he gathered that "Coalite" burned away very quickly, and, therefore, was likely to be rather an expensive fuel. All he could say was that if "Coalite" should prove to be a success, and there should be a great demand for it, then gas companies could produce something almost precisely similar, and they ought, therefore, to share in whatever profit there was in it. The proprietors need be under no misapprehension that the Company would suffer much from the competition of "Coalite." The Gaslight and Coke Company had produced, with their ordinary apparatus, a very similar substance which they called "Carbo;" and they were prepar d to put it on the market at any time.

THE HALF-YEAR'S WORKING.

Turning from what may be to what is, the Chairman directed attention to the principal items in the accounts. Referring first to the capital

account, he said that during the half year they had sold by auction £50,000 of their 4 per cent. stock, which produced £51,747. The effect was not apparent, except to a small extent, in the accounts, because the larger part of the stock was only paid for on July 2, after the accounts were closed. The account showed they had received £11,669; and so there was a balance of £40,078 paid up after June 30. Then with regard to the capital account, the proprietors would be thought observe, with satisfaction, that there was again no charge for works or mains, but only for the provision of stoves and prepayment meters, and services to supply them. Their Engineer advised them that their works were amply sufficient for any increase in trade they were likely to get for some time to come, so that he (the Chairman) hoped they would avoid increasing their capital account in respect of works and mains. The figures showed a reduction of the Company's capital expenditure per million cubic feet of gas. It was gradually coming down; and they were pleased to see it doing so. Turning to the revenue account, they had sold 1578 million cubic feet of gas in the half year, against 1530 millions in the corresponding period of 1906—an increase of 48 million cubic feet, representing 3·14 per cent. upon their sales. The Gaslight and Coke Company had an increase of just over 3 per cent., and the South Metropolitan Company one of 2¾ per cent. The advance in the sales gave them an increase in the revenue from gas of £5552; the comparative figures being £187,246 for the past half year, and £181,693 for the corresponding half of last year. From stove and meter rental, they received an additional £2166; and from residual products, £5874—the total increase of revenue, allowing for £9 less in miscellaneous receipts, being £13,583. The gross cost for manufacture and distribution £14,089 more; so that the net profit was less by £506. The balance to the profit and loss account was £61,806, against £62,311. Here he should like to mention that, while the extra quantity of gas manufactured was 3 per cent., the total carbonizing wages had only increased by less than 1 per cent.; and as further evidence of good working in the retort-houses, he might say that the make of gas per ton of coal carbonized had increased from 10,745 to 11,036 cubic feet. He thought this testified to the good work of the employees, the foremen, and the engineers. Dealing with the gross profit of £61,806, it was sufficient, after deducting the interest on the debenture stock and floating balances, to pay the dividend they had been accustomed to receive now for some ten half years—that was, £5 4s. per cent. on the 4 per cent. stock, and £5 per cent. on the 3½ per cent. stock, and leave a surplus of £556, which the Directors proposed to carry forward to the current half year, making the balance of undivided profit £23,503. For some time past now they had been adding to their reserve fund at the rate of rather over £1000 a year, and they had been adding to the insurance fund at a nearly similar rate. The reserves of the Company—including the reserve fund proper, the insurance fund, and the sum carried forward—now amounted to more than £90,000; and this compared very favourably indeed with the reserves of the two other Metropolitan Companies, which, considering the size of the concerns, were not so large. As to the future, he had no misgivings; though he did not expect that, when the Board met the proprietors in February, they would have earned their full statutory dividend. But he did hope that, if the increase in their sales kept up, and if the price of residuals improved, they would be justified in recommending to the proprietors the payment of the same dividend as they proposed that day.

The Deputy Chairman (Mr. Walter Hunter) seconded the motion.

Mr. George Ennis, referring to the Chairman's allusion to the coal situation, remarked that he believed the congestion at the ports was prevalent to a considerable extent now. The coal was going abroad in large quantities; and it seemed to him that this was one of the political chickens of the present Government coming home to roost. He thought this might have been arrested by maintaining a duty of 1s. to 2s. per ton of coal, and keeping some of the coal at home. He hoped, when the facts as to the situation reached the ordinary consumer, it would bring about a revulsion of feeling, and a better state of things than the present. He hoped the advance in the price of gas would be found adequate.

The motion was unanimously carried.

Proposed by the Chairman, and seconded by the Deputy-Chairman, a dividend was declared at the rate of £5 4s. per cent. per annum upon the 4 per cent. stock and of £5 per cent. per annum upon the 3½ per cent. stock, both less income-tax.

Prepayment Meter Robberies.

On the motion of Mr. Arthur Harston, seconded by Mr. Wilshaw, and supported by Mr. Charles M'Naught, a hearty vote of thanks was passed to the Chairman and Directors. The last-named gentleman said that many of the proprietors noticed what seemed to be the increasing appearance of their Solicitor in the Police Courts, prosecuting thieves of cash from prepayment meters. What he wanted to elicit from the Chairman was whether there was an increasing propensity in the locality in which the Company operated to rob these meters, and whether the total sum at stake was so large as would appear from the frequency of the prosecutions.

The Chairman, having acknowledged the vote on behalf of himself and his colleagues, said, as to the question of robberies from slot-meters, the ratio did not increase, because the number of slot-meters had grown so largely. The number had gone up from 50,000 to nearly 59,000 in the last twelve months. The Board were only discussing that morning whether there was any possibility of avoiding these robberies. It was, of course, a very difficult question. The prepayment meters were very flimsy things; and if a man wanted to break one open, he could easily do so. He did not know what, without going to great expense, the Company could do in this matter. Considering the number of meters fixed in the Company's district, the amount lost from them was really infinitesimal. But from the point of view of morality, they would be very glad if they could find means to prevent the robberies. He was bound, however, to confess that he did not know what the means should be. Proceeding, he proposed a vote of thanks to the chief officers, their staffs, and the employees—remarking that the work of the half year had been well and efficiently done. Their relationship with the workmen was of the best possible description. The other day the Board had a meeting with the Profit-Sharing Committee (one-half of whom were elected by the workmen, while the other half were the nominees of the Directors), and it was one of the pleasantest meetings they had ever had. There was proof of good feeling on all hands; and the members of the Committee entered most cordially into the position of the Company, and with no grumbling that the bonus was falling by ½ per cent. The reduction of the bonus would cause the men to suffer perhaps more heavily than either of the other co-partners. It was a great grief to the Directors that they were obliged to curtail the bonus; and they would look forward with the greatest pleasure to the time when it would get back to its past best figure. The staff and workmen had now an interest in the Company amounting to nearly £35,000; and he (the Chairman) was happy to say that of this sum £29,000 was wholly due to the profit-sharing system. He did not think this had cost the proprietors anything in the way of dividend; he did not think it had added anything to the price of gas; but he did know that it had added materially to the prospects and well-being of their workmen.

The Deputy-Chairman, in seconding, joined in all the Chairman had said regarding the merits of the profit-sharing system. When the Directors visited the works the other day, they were pleased to see the state they were in; and the Profit-Sharing Committee were gratified because the Directors noticed this.

The motion was unanimously carried.

Mr. Ellis responded on behalf of himself and his staff; recognizing most fully his own indebtedness to the staff for their assistance. Referring to the position of things in the Money Market, he said everybody was aware how much first-class securities had depreciated. Consols had depreciated more than anything else; on the previous Monday the price was as low as 80⅜—probably a record price, even after making allowance for the difference in the rate of interest. It must be gratifying to gas shareholders to observe that, while Consols had gone down, gas stocks had kept fairly steady. There was one other point to which he might be permitted to refer. He thought it must be confusing to some people that a dividend of £5 4s. per cent. should be declared on a 4 per cent. stock and £5 per cent. on a 3½ per cent. stock. Of course, all present at the meeting understood the matter, but the man in the street did not. He put the point respectfully to the Board whether it would not be more convenient if it were resolved to call the 4 per cent. stock, "A" stock; and the 3½ per cent. stock "B" stock.

Mr. Stanley H. Jones (the Engineer) also responded on behalf of himself, his staff, and the workmen. In his concluding remarks, he alluded to the robberies from prepayment meters, and said that the proprietors need not have any fear that the Company did not take every possible step to stop these. It was generally found that a fresh crop of robberies was due to a band of hooligans, who were run to earth eventually. The peculiar character of the East-end district would always bring this kind of thing into view; but they could not hope to avoid it entirely.

SHEFFIELD UNITED GASLIGHT COMPANY.

Half-Yearly Report and Accounts.

In the report to be presented by the Directors at the half-yearly general meeting of the Sheffield Gas Company on the 3rd prox., they make the satisfactory statement that the combination of good trade in the city, gloomy and cold weather, and last, but not least, the very low price of gas, resulted in an increased sale, in the six months ending the 30th of June, of 133,811,000 cubic feet, or 9·33 per cent. more than in the corresponding period of last year. The charges per 1000 cubic feet of gas were: From January to March, 1s. 5d., 1s. 3d., and 1s. 1d., according to consumption; and from April to June, 1s. 4d., 1s. 2d., and 1s.—the average price over the half year having been 1s. 3·49d. The accounts accompanying the report show that the sale of gas produced £100,203, and of residuals £67,941; the total revenue being £177,952. The expenditure on manufacture of gas amounted to £96,092 (coal costing £54,405 and repairs and maintenance of works and plant £21,539); on distribution to £14,921, and on management to £6073; rents, rates, and taxes came to £9302; and the total expenses were £127,869. The balance of £50,083 is carried to the net revenue account. The Directors recommend the payment of the usual dividends on the three classes of stock, after which there will be a sum of £2440 to be added to the balance carried forward from previous half years.

WANDSWORTH AND PUTNEY GAS AND COKE COMPANY.

The Half-Yearly General Meeting of this Company was held last Tuesday, at the Company's Offices, Fairfield Street, Wandsworth—Mr. H. E. Jones in the chair.

The Secretary (Mr. Chas. W. Braine) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The Company's Half-Year's Progress.

The Chairman said it was again his pleasing duty to move the adoption of the report and accounts. The material question for the proprietors was that the profits for the past six months enabled the Directors to recommend the declaration of dividends at the statutory rates; and in addition they had the rather satisfactory surplus (satisfactory because they were not a Company that indulged in surpluses as a general rule) of £2492. The working throughout the undertaking had been very good. The income had increased by £4200, made up of £2570 for gas, £543 for meter and stove rental, and nearly £1200 for residual products. The amount of gas sold was 507 million cubic feet, which showed the gratifying increase of 5¾ per cent. There was an increase in the number of consumers of 446, which was a trifle less than their usual addition. The increase was chiefly among the automatic meter consumers, who accounted for 305 of the total. An additional 557 stoves had been sent out in the half year, which could only be attributed to

the higher price of coal driving people to use the cheapest gas in London for cooking. The amount of capital spent in the half year was very small—£1734. It consisted of £348 on mains and services; and the whole of the rest was for the supply of meters, stoves, and automatic fittings. With reference to the expenditure, if comparison were made with the June half of 1906, the costs would be found singularly alike. The whole cost of manufacture was within a few hundred pounds the same; and distribution was a few hundreds less. The item of rates and taxes was £200 more; and, with this exception, all of what he might call the humdrum charges were about the same. Inasmuch as the income was, as he had shown the proprietors, larger for gas and residuals, they had the satisfactory profit of £15,939, which was £2900 more than the profit for the corresponding period of last year.

COAL AND GAS PRICES.

The Directors had realized with some concern that they had had to make their new contracts for coal at a very heavy advance; but they had not given notice of any increase in the price of gas at present, because they felt it was desirable to see what the exact working of the half year was before coming to any conclusion. Seeing that they had the very satisfactory surplus of £2492, that some of their coals at the lower prices would continue to be supplied during the current half year, and that the oil contract had been renewed at a fairly moderate advance, the Board thought they were justified, in this district—where the authorities had always met the Company very reasonably and fairly—in refraining from raising the price at present. The rating had been fairly adjusted; and the removal of lime purification had been volunteered by their kind friends, the local administration, before the Company got their Act of Parliament last year, and rendered it legally operative. Therefore the Board thought it only right to follow their old principle of postponing as long as they reasonably could the incidence of the extra coal prices upon the consumers. But he could assure the proprietors that they had not the slightest intention of frittering away the balance or reserve fund by the Quixotic process of supplying gas at less than it cost them, and so encouraging the gentlemen dealing in the coal trade to suppose they could avail themselves of the balances always in the hands of gas companies. In the early part of this year, he cut a slip from the "JOURNAL OF GAS LIGHTING" [Feb. 19, p. 492] quoting a statement from the "Sheffield Daily Telegraph" (a paper which was in touch with the coal-mining interests). This Sheffield paper said: "An arrangement has been entered into between the colliery owners in Yorkshire, Lancashire, Derbyshire, and Notts, with a view to so liftir g contract prices for gas coal that a portion of the large profits now being earned by gas companies in all parts of the country shall be transferred to the colliery owners' pockets." Now there were people who said that the advance in the price of coal was not a matter that was under the influence of the coal owners at all, but that it was merely a question of the markets; but those who read the "JOURNAL OF GAS LIGHTING" would find the words he had quoted put on record in its columns, showing clearly what the intention was, before the ordinary period when gas undertakings were making their contracts. Undoubtedly, there was a considerable increase of trade in the country, involving the use of a larger quantity of coals; and gas companies would not complain of that in the least if that were the only cause for the increased coal prices, because this would mean there was more money circulating in the country, and consequently more gas, residuals, and so forth would be consumed. But unfortunately the export duty of 1s. per ton was let go about a year ago; and this happened to coincide with some bad accidents in coal mines on the Continent, and with certain activity in other markets in the northern part of Europe. Therefore, gas companies found they were not merely competing with the coal users of England, but were confronted with the stimulated competition from these foreign sources by the concession in the way of the coal duty, which would compensate buyers probably for nearly half the cost of shipping coals from our shores to those of other countries. This had been pointed out with the greatest emphasis by the *doyen* of the gas industry, Sir George Livesey. The reply made by a member of the House of Commons was: "Yes, but see how this country is enriched by the sovereigns that flow in from the coals that flow out." That was about as short-sighted a view of the political economy of the position as could possibly be, because a ton of coal in the mine was practically so much more money in the bank; and for this country it meant not only the money value realized if it were sold abroad, but industrial value if it were used to turn mills or engines or to promote the manufactures of England by the employment of British labourers, who unfortunately at the present time were complaining of want of employment, However, it was not for them to indulge in politics in connection with the Company. What they had to do was to run their own happy course in the best way they could. But for himself and for his colleagues, he might say they regretted the short-sighted removal of the 1s. per ton. As a Director of three or four foreign gas companies, he might say that, on the face, it formerly did appear that the abolition of the duty would give them some slight relief; but the result was that, instead of giving them relief, it had stimulated competition from the Continent in our coal market, and so raised the price of coals by a very much larger amount than the shilling made in countervailing advantage.

UNSATISFACTORY STATE OF THE RATING QUESTION.

The past year had seen the settlement of the quinquennial reassessments. Re-valuations came in the years ending with "5" and "0," and their discussion took place in the years ending with "6" and "1." In their own case, they were able to settle the assessments peacefully and he thought not unrighteously. He was the more pleased over this because rating questions had been very much in the air; and two or three efforts that had been made by gas companies to get better justice in these matters had not been so far successful. He should weary the proprietors if he told them what a difficult and troublesome subject this was. They were assessed from the view of a hypothesis which could be dragged and strained in every direction according to the interests of the gentlemen engaged in applying the hypothesis. The one gleam of satisfaction he had, in reading his papers, was that the Premier had said there was in view a Rating Bill, which, if it followed the report of the Royal Commission on the subject, would probably sweep away the present troublesome, vexatious, costly, and entirely unsatisfactory process by leaving the establishing of rating value of an undertaking like their own in the hands of perfectly impartial and qualified men. At present, as the proprietors were aware, municipal government was carried on by means of the rates; and it was so very easy to raise the rates from gas, water, and other companies. Very often, in his own practice, he had found a surveyor employed for the purpose of making reassessments paid by commission on all he could stick on. Extra money was required for such things as they had seen exposed to public criticism by certain inquiries in different parts of London, the sense of proportion of the authorities in which seemed to be of a character which led them to spend as much on one pauper as would relieve three, under the mistaken notion that they were wisely and philanthropically discharging their duty. He could not conceive a more spurious form of philanthropy than that of wasting the money that was extracted from different industrial companies which gave employment to so many. He had travelled beyond the direct limits of the resolution, which it was his pleasure to move; but he felt very acutely the importance of the matters upon which he had spoken.

The DEPUTY-CHAIRMAN (Mr. T. A. Ives Howell) seconded the motion, which was unanimously adopted.

The CHAIRMAN next moved the declaration of dividends at the rates per annum of 8 per cent. on the "A" consolidated stock, of 6½ per cent. on the "B" consolidated stock, and of £5 12s. per cent. on the "C" stock. He wished to point out that the only part of the £438,000 which constituted their capital that received the 8 per cent. was £30,000, and that the whole of the capital that they were now, and had recently been, calling up had to be contented with the modest dividend of £5 12s. per cent. The moderateness of these dividends should really be borne in mind by those people who assessed the Company for rating, because the most extraordinary delusion was abroad based on the fact that, in theory, gas companies were allowed to pay 10 per cent., and that they supplied very little to the consumer beyond the meter, and therefore had little of what one might call tenant's interest in the rating question as now established. In their case they only received £5 12s. per cent. on their capital; and that would probably be much less for future investors, who would have to buy by auction at a price that would only yield 4½ per cent. The hypothesis in rating was that one interest should have 5 per cent. and the other 17½ per cent. The proprietors could form their own arithmetical calculations as to the possibility of getting any portion of 17½ per cent. with the 5 per cent. for themselves when money was raised in the market at 4½ per cent.

The DEPUTY-CHAIRMAN seconded the motion, which was unanimously carried.

On the proposition of the CHAIRMAN, seconded by Mr. H. S. FREEMAN, a resolution was proposed increasing the salary of the Secretary by £100 per annum. In the course of his remarks in submitting the resolution, the Chairman made handsome recognition of the services of both the Secretary (Mr. Braine) and the Engineer (Mr. H. O. Carr); and these gentlemen subsequently made their acknowledgments.

Moved by Mr. J. C. BADCOCK, C.B., seconded by Mr. J. DENNY, a hearty vote of thanks was passed to the Chairman and Directors.

A WARNING TO GAS STOCKHOLDERS.

The CHAIRMAN responded. In doing so, he said he should like to warn proprietors against parting with their shares at too low a price. Their Company had worked up a strong position. The dividends were moderate; but they were very certain and sure. There was, in fact, no more stable property in the gas industry than the stock of the Wandsworth Gas Company. He was sorry to see there had lately been, through some unexplained circumstance, sales of stock at less than it was worth. It was possible the advance in the price of coal might have caused some little revulsion of feeling. He did not say the advance in the price of coal would not cause some disposition to reduce gas stocks in the public estimation. He did caution proprietors in this Company that theirs was a property quite of the first class, and ought not to be sold at a lower rate than the best gas property in the country. That, at all events, was his own opinion.

BROMLEY GAS CONSUMERS' COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held last Tuesday, at the "Bell" Hotel, Bromley—Mr. ALEXANDER DICKSON in the chair.

The SECRETARY (Mr. H. W. Amos) read the notice calling the meeting; and it having been agreed to take as read the Directors' report and the accounts,

The CHAIRMAN moved their adoption. In doing so, he said the salient feature in their business in the half year had been, he thought the proprietors would all agree, the continued increase in the sale of gas. The increase was 6¾ million cubic feet, which was about the same as that of the corresponding half of last year, when it was 7 million cubic feet. It would be remembered that, in their last report, the Directors notified to the proprietors a substantial advance in the price then ruling for gas coal. There had since been a further considerable advance; the present price of Durham gas coal being quoted at fully 60 per cent. above its cost only two years ago, and about 100 per cent., or double what it was sold for a few years back. The lower price for coal had enabled the Directors to reduce the price of gas to the lowest rate ever reached by the Company; and they had been indulging the hope that the economies they were effecting by the new manufacturing plant, might enable them to still further reduce the price. These hopes, however, had been frustrated for the present, and without the slightest possibility of their having been able to prevent it. The untimely withdrawal of the export duty on coal, concurrently with its larger use in home industries and factories, presented an opportunity to the coalowners and the miners of which they had promptly availed themselves. He thought that no one begrudged the increased cost of commodities arising from activity in the home industries. But whatever might be their individual appreciation of the ethics of a national system of export and import duties, or of the unrealizable ideal of absolute free trade, the fact to-day in the

gas industry was that both shareholders and consumers of gas in the vast multiplicity of trade and household interests dependent upon its use, were being seriously prejudiced by the abnormal inflation of the price of gas coal, which had been so greatly facilitated by the concession to foreign buyers and by their purchases in the British coal markets. The Company's two contracts for the twelve months, each from a new field of supply, had been made at prices exceeding 50 per cent. over those of two years ago; and, in the circumstances, the advance in the price of gas, to 3s 3d. per 1000 cubic feet, was unavoidable. While the Board would most gladly hail an early return to normal prices, one could not, unfortunately, in the face of recent reports, discern at present any rift in the cloud. That they did endeavour to supply gas as cheaply as possible, was attested in this: That, whereas the reduction to 2s. 11d. per 1000 cubic feet was 1s. 7d. below the statutory price, and thereby authorized a dividend on the "A" stock at the rate of £7 7s. 6d. per annum, the holders of that stock had only been taking 6 per cent. per annum, and in the case of the "B" stock, the holders had been receiving £4 10s., instead of £5 17s. 6d. The foregoing of this difference had, *pro tanto*, allowed a cheaper price to be charged. So with gas at 3s. 3d. per 1000 cubic feet, the dividend authorized on the "A" stock was 6⅞ per cent., and on the "B" stock 5⅜ per cent. per annum, or ⅞ per cent. per annum on both stocks above the current dividend. The surrender of this difference would similarly enable the charge for gas to be so much lower than it would otherwise have to be. He took it the stockholders generally would be, as they had been, content it should be so until at least better times came round. Half-yearly dividends of 3 per cent. on one and 2½ per cent. on the other of the Company's stocks, could not be classed as other than reasonably moderate. He was glad to be able to confirm the report the Directors made at the last meeting upon the economies derived from the recently erected coke-conveyor and coke-haulage plant. It would, however, perhaps be more satisfactory to reserve the actual figures until they had a complete year's working before them. At the next meeting he should be in a position to give the figures to the proprietors, if they would be interested in having them. Turning to the accounts, the proprietors would have noticed, in making comparisons, that the increased revenue from gas, meter rental, and coke approximated to £2000 in the half year, and that this advantage was practically absorbed by the extra cost of coal and other increased charges in the expenditure. There were, quite regularly, small variations in the amounts of most of the subsidiary service accounts, which, however, about counterbalanced one another in the total. To these he need not refer, beyond saying that the carbonizing wages were less by £235—not that the Directors had reduced the payments to any of those they retained in their employ, but naturally a lessened number of hands were required to work the new plant. The net result of the half year was that the balance carried to profit and loss account, after deducting interest on debenture stock and loans, sufficed for the payment of the same dividends as heretofore on the ordinary capital stock, and yielded a surplus of £109 to be added to the balance of undivided profit to be carried forward, which would then be £2296. In addition, the reserve and contingency funds would stand at about £9000.

The DEPUTY-CHAIRMAN (Mr. Bertram H. Latter) seconded the motion, which, after a few observations from proprietors on matters of a purely domestic nature, was unanimously carried.

Proposed by the CHAIRMAN, and seconded by Mr. HUGH WYATT, a dividend was declared at the rates per annum of 6 per cent. upon the "A" ordinary stock and 4½ per cent. on the "B" ordinary stock, less income-tax.

The Chairman and Directors were heartily thanked for their services on behalf of the Company, on the motion of Mr. G. WEEKS, seconded by Mr. F. W. PEILL.

The CHAIRMAN, having replied, moved a similar complimentary vote to the Engineer (Mr. W. Woodward), and to the Secretary (Mr. H. W. Amos), both of whom, he said, had had to take their full share of the anxieties and responsibilities that recently beset the Company's way.

The motion was cordially agreed to.

Mr. WOODWARD in thanking the proprietors for their kind expression of good will and appreciation of his services, remarked that all gas engineers had a rough time at present, what with labour troubles, the new Workmen's Compensation Act, and dearer coal. Although they had to face a higher price for coal, with the better results they were getting by the aid of the new machinery, and one thing and another, they would be able to tide over these difficulties.

PROVINCIAL GAS COMPANIES.

Gas and Electricity Supply at Ascot.

In pursuance of the provisions of the Ascot District Gas and Electricity Act, 1906, under which the Ascot Company are now working, only one general meeting of shareholders has to be convened—viz., in the month of February. The Directors are, however, empowered to declare an interim dividend; and they have accordingly issued the accounts for the six months ending the 30th of June. They show that the revenue in that period was £5475, compared with £5216 in the first half of 1906; while the expenditure was £3358, compared with £3199. The balance carried to the net revenue account is £2117, against £2017 this time last year. The amount available for distribution is £2581; and an interim dividend at the rate of 5½ per cent. per annum (less income-tax) is declared. The quantity of gas sold for private consumption in the half year was 19,485,600 cubic feet, and an estimated quantity of 423,000 cubic feet under public lighting contracts; making a total of 19,908,600 cubic feet. The electricity works are now in process of construction, and the Directors state that they already have indications of a satisfactory demand when the supply is available.

Increased Sales at Camborne.

A satisfactory report was presented at the annual meeting of the Camborne Gas Company last Wednesday. The statement of Mr. W. Bailey, the Secretary and Manager, showed that the make of gas had increased by 1½ million cubic feet, and the sales by upwards of 1 million cubic feet. The output of residuals had also shown a satisfactory increase. It was pointed out that though the price of coal had advanced by 12½ per cent., there was no increase in the price of gas. It was decided to pay a dividend of 3 per cent. for the half year, making 5½ per cent. for the year. Mr. H. P. Vivian presided over the meeting; and it was reported that the Directors had elected him Chairman, in place of Mr. J. M. Holman, who had resigned his seat on the Board.

Increased Sale of Gas at Melton Mowbray.

At the annual meeting of the Melton Mowbray Gas Company held last Friday, under the presidency of Mr. T. Glover, J.P., the Directors expressed their pleasure at reporting an augmented sale of gas, a much larger revenue account, and greater profit. Prepayment meters realized £2250—an improvement on the year of £370; and it was thought there was every probability that the business would increase. General satisfaction was expressed; and though coals are costing much more on the new contract than on the old one, the Directors were in a position to say that they did not think the price of gas will have to be increased. The usual dividend of 7½ per cent. was declared on the whole of the capital.

Another Successful Year at Taunton.

The report presented at the annual meeting of the Taunton Gas Company last Tuesday showed that in the period covered by it—viz., the twelve months ended the 30th of June—the quantity of gas sent out had been 98,374,500 cubic feet; being an increase of 4,110,700 cubic feet over the quantity delivered during the preceding twelve months. The accounts showed that the revenue amounted to £19,184, and the expenditure to £13,849; leaving a balance of £5335 to be carried to the net revenue account. The amount of profit available for distribution was £8385, out of which the Directors recommended dividends at the rate of 5 per cent. on the preference stock, 8 per cent. on the consolidated "A" stock, 7 per cent. on the "yellow" shares, and a similar amount on £12,900 of new ordinary stock. These dividends would absorb £3720. The Directors further recommended that the additional dividends (of 1 per cent. and ⅛ per cent. respectively) which are payable under the sliding-scale, and amount to £454 2s. 6d., should be transferred to the reserve fund account. The Chairman (Mr. J. Barrett), in moving the adoption of the report, referred to the satisfactory progress made in the business of the Company. They had had such a successful year that, had it not been for the increase in the cost of coal, they would have been able to reduce the price of gas. In conclusion, the Chairman mentioned that, owing to the increased consumption of gas last winter, it would be necessary to put up a new gasholder. The report was adopted, and the dividends recommended were declared. The Chairman, in proposing a vote of thanks to the Secretary and Manager (Mr. Alfred J. Edwards) and the staff for their services during the year, paid a high compliment to Mr. Edwards for his efforts in promoting the success of the Company. Mr. O. G. Walter, another of the Directors, seconded the proposition. Mr. R. Bruford, also a member of the Board, in supporting it, said that had it not been for the wise foresight of Mr. Edwards during the many years he had been connected with the Company, they would not be in the favourable position they were at the present time. The vote having been heartily accorded, Mr. Edwards, in reply, said it was a great satisfaction to him to know that his efforts were appreciated by gentlemen with whom he had had the honour of being associated for so many years. Few men were better served by a staff of assistants than he was; and he was glad to be able to say that the most cordial relations existed between them. A vote of thanks to the Chairman concluded the meeting.

A Good Store of Coal at Tunbridge Wells.

At the half-yearly meeting of the Tunbridge Wells Gas Company last Wednesday, the Chairman (Alderman W. H. Delves) devoted, as was to be expected, a good portion of his remarks to the subject of the rise in the price of coal. There was no report presented; and therefore he gave the proprietors an idea of the progress of the business. He said the Company had had a prosperous half year; but, as they were no doubt aware, coal had gone up considerably in price. Fortunately the Company had made their contract last year, and it would last until the end of September. They had, therefore, not felt the rise in the price of coal, and it had been no additional expense to the Company up to now. They hoped that having three months of the present half-year's coal in stock at the present price, the general increase would not affect them during the present year. Their coal up to June 30 had only cost them 5d. per ton more than during the corresponding period of last year. Oil had cost ½d. per gallon more; but this was set off almost entirely by the increased price of residuals. In fact, they had used more raw material by about 400 tons of coal and 10,000 gallons of oil than in the corresponding half of last year; but, taking into consideration the price received for residuals, the cost was within £40 of that incurred during the corresponding period of last year. Taking the net cost per 1000 cubic feet of gas, there was a slight decline. They reduced the price of gas last year by 2d. The present price was 2s. 8d.; and the sale of gas during the half year had reduced the income of the Company by £1150, which remained in the pockets of the consumers. The increase in the quantity of gas sold, however, had considerably counteracted the loss resulting from the reduction in the price of gas. With the increase of 4½ million cubic feet of gas, the total rental had been reduced about £500. The additional sale had been about 3½ per cent., which was a very gratifying increase over last year. The prospect of the Company was a favourable one, and he quite looked forward to the hope that when he met the proprietors again they would be able to show a satisfactory balance-sheet for the current twelve months. The crucial position would be next year. The Company had paid for their coal this year; and though the advance in price was something like 3s. a ton, they hoped they would be able to hold out until the present excitable state in the coal market had subsided, and there were more reasonable prices. The demand for coal at present was very great from abroad, where enormous quantities had been bought to be used in competing with our own manufacturers. One could not see the policy of this; and it seemed a suicidal thing that we should supply foreigners, and that they should compete with our own industries. In conclusion, the Chairman proposed that an interim dividend as last year—viz., at the rates of 12 per cent. on the ordinary stock, 9½ per cent. on the "B" stock, and 9 per cent. on the "C" and "D" stocks—should be declared. This, less income-tax, came out at £5529. The motion was carried, and the proceedings closed with a vote of thanks to the Chairman.

THE PROPOSED FEDERATION OF POTTERY TOWNS.

Financial Proposals.

In connection with the suggested federation of towns in the Potteries, to which reference has already been made in the "JOURNAL," the following financial proposals, prepared by Alderman F. Geen, have been submitted to the various local authorities.

1.—For a period of ten years there shall be differential rating; each town being a rating area.

2.—An account shall be prepared for each town, as on the day upon which the new borough comes into existence, of its liabilities other than loans or the balance of loans raised under any Local Act of Parliament or sanction of the Local Government Board, and such assets, excluding sinking funds, as may have been acquired direct out of revenue. All such assets shall be taken over by the new borough, and dealt with as provided for under clause 3.

3.—Should the assets of any town exceed its liabilities, one-tenth of the difference shall be raised annually for ten years by all the towns in proportion to the rateable value, and applied in reduction of the rates of the town possessing the excess assets, as provided for in clause 4. Should the liabilities of any town exceed its assets, one-tenth of the difference shall be raised annually for ten years by such town, and applied in reduction of the rates of all the towns in proportion to rateable value, as provided for in clause 5. The assets and liabilities to be dealt with under this clause are those to be included in the account referred to in clause 2.

4.—During the period of differential rating, each area shall be credited with (*a*) the sums, if any, receivable under clause 3; (*b*) all grants receivable from the National Exchequer as at present; (*c*) its proportion, based on rateable value, of grants in respect of local taxation, licence duties, &c., estate duty, and customs and excise duty; (*d*) profit, if any, on its industrial undertakings; (*e*) moneys receivable as at present in respect of cemetery, baths, town hall, markets, shops, and other properties, private street improvements, &c.

5.—During the period of differential rating, each rating area shall be debited with (*a*) the sums, if any, payable under clause 3; (*b*) loss, if any, on its industrial undertakings; (*c*) interest on loans and repayments of principal; (*d*) all moneys expended thereon, as at present, except that a proportion only, based on rateable value, of such administrative charges as are common to the new borough shall be debited.

6.—Each rating area (except Hanley, which has already had its adjustment) shall be credited or debited, as the case may require in proportion to rateable value, with any sum or sums receivable from, or payable to, the Staffordshire County Council in respect of any adjustment made between that Council and the new borough.

7.—During the period of differential rating, separate accounts shall be kept for each rating area, and rates to cover the difference between the sums debited and credited shall be levied on each area in accordance with the scheme above outlined.

8.—After the period of differential rating, all income and expenditure shall be common to, and uniform rates levied throughout, the new borough.

THE CENTENARY OF GAS LIGHTING.

[From the "Daily Telegraph," Aug. 16.]

It is exactly one hundred years ago to-day that the first street in London, or, for the matter of that, in the world, was lighted with gas. As with many epoch-making events, this great advance in urban civilization was ushered in with something like humility. For it was not one of London's great thoroughfares nor one of its fashionable haunts that thus led the way in street lighting, but a little byway in Aldersgate—Golden Lane, to wit. True, it was a district rich in historical association, for near by Prince Rupert had lived and worked at his chemical experiments and the new mode of engraving, since called mezzotint—a method which has produced in our midst many excellent artists. Very close by, too, had stood the Fortune Theatre, where Henslowe and Alleyn had produced so many of the great dramas which that wonderful time was giving the world; and on the very spot had stood Tom Killegrew's Nursery, the first dramatic academy in our country, and probably in the world. But none of these things were of such far-reaching and lasting effect as the event of a hundred years ago, inaugurated with no fuss or ceremony, and the very memory of which has now to be hunted out of all but forgotten journals, magazines, or volumes of reminiscences.

As with most new departures, there is some dispute about the facts, and some contradiction even among those who profess to have been actual eye-witnesses. Thus, J. R. Planché, Somerset Herald, and long a popular writer for the stage, tells us: "On Jan. 28, 1807, I had wandered down Pall Mall with my father, and seen the first lamps lighted with gas in London." This is misleading, both as to the fact and the implication. The first gas-lamps lighted in London, apart from private experiments, seem beyond doubt to have been those shown in 1803 and 1804, at the Lyceum Theatre, by Mr. Winsor, a German scientist, who took out some patents and tried hard to float a company for lighting London with coal gas, but failed to obtain the necessary Act of Parliament. . . . The lights which Planché saw were most probably at Winsor's shop in Pall Mall, adjoining the garden wall of Carlton House on the east. On the King's birthday, this pioneer gave what was then a grand display on the wall between St. James's Park and Carlton House Gardens. Thirty-two lights were shown—some naked, some covered with glass—a Prince of Wales's feathers in gas over the private door to the garden, and an illuminated transparency over another gateway. A contemporary account of this exhibition concludes: "Hopes may now be entertained that this long-talked-of mode of lighting our streets may at length be realized. The Mall continued crowded with spectators until near twelve o'clock, and they seemed much amused and delighted by this novel exhibition."

The proprietors of the Golden Lane Brewery made the first effort in the permanent lighting of a public thoroughfare by gas on Aug. 16, 1807. The gas was made on the brewery premises. Seven lamps were fixed in Golden Lane, and four in Beech Street, at distances of about 20 yards. This experiment seems to have been entirely successful.* Finsbury Square is stated to have been the next public place in London to adopt the new illuminant, and Grosvenor Square (which did not discard its oil-lamps till 1842) the last. It was five years, however, before a company was established for the supply of gas. When this was done, its use spread with such rapidity that in less than ten years the new method of lighting was general in London, and had spread to most of the chief cities in England and abroad.

THE COST OF TARRING ROADS.

The Local Government Board have communicated to the Lindfield (Sussex) Parish Council a decision upon tarring roads to lessen the dust nuisance brought about mainly by motor traffic, which will cause consternation throughout East Sussex. A short time since, the East Sussex County Council notified the rural districts that they were prepared to tar-spray roads if the local Councils would guarantee half the cost. Many of the Councils accepted the offer—Lindfield among the number. A long length of road was tarred, the half cost of which was £25. The Local Government Board have now written to say that they cannot see their way to sanction this amount being made a special charge upon the parish. If this decision is adhered to, the individual members of the Council will have to refund the money. In the House of Commons, on Monday last week, Mr. Lonsdale, the Member for Mid Armagh, asked the President of the Local Government Board whether he was aware that Rural District Councils desired to co-operate with County Councils in the mitigation of the dust nuisance by spraying the roads with tar; whether the Board had decided that the first-named Councils could not incur expense in this direction; and whether some modification of the decision was possible. Mr. Burns said he was aware of the desire referred to. He presumed that the roads to which the hon. member alluded were main roads. Those in rural districts were maintained by the County Council; and the question was whether a Rural District Council could legally contribute towards the cost of spraying them with tar. They could do so if the operation could be brought within the terms of section 3 of the Highways and Bridges Act, 1891; but he was advised that it could not safely be held that this was the case. He added, in answer to a further question, that this was one of several matters which he hoped to be able to go into during the recess.

HALIFAX WATER SUPPLY.

Approaching Completion of the Walshaw Dean Reservoirs.

It is expected that within the next few months the water supply of Halifax and district will receive an important addition by the completion of the reservoirs of the Corporation at Walshaw Dean, the Engineers for which are Messrs. G. H. Hill and Sons, and the Contractor is Mr. Enoch Tempest.

The decision to construct the new reservoirs was come to about seven years ago, not, however, without encountering considerable opposition. Their completion will give an available daily supply of 2½ million gallons; bringing up the total for the Corporation's water-works system to about 8 million gallons per day. Consequently, Halifax will be assured for many years against danger from shortage of water; indeed, for some time to come it will have a good deal more than it requires. Already Morley has entered into an agreement with Halifax for the sale of a quantity of water. The site of the new reservoirs is a valley on Walshaw Moors, 1150 feet above the sea level. They are three in number, lying one behind the other, and having a total length of 1½ miles. The combined capacity of the reservoirs is 650 million gallons; and their surface area is upwards of 100 acres. The total drainage area is 2352 acres—almost all moorland. The upper reservoir will hold 214 million gallons, and has a depth of 75 feet; the middle reservoir, with a depth of 78 feet, will contain 266 million gallons; and the lower reservoir (the smallest) has a holding capacity of 141 million gallons and a depth of 76 feet. The middle reservoir will be chiefly used for supplying the town; but provision has been made to draw water from any one of the three. The compensation water will be about one-third of the daily supply, or nearly 1,600,000 gallons daily. This is just about the same as that from the Widdop reservoir; the only difference between the two cases being that the compensation from Walshaw Dean is to be continuous, instead of during only the twelve hours of the day. The compensation stream will pass through a gauge basin at the bottom of the lower embankment. There is a discharge tunnel at each embankment; and it is possible to draw off water at three levels from valve-shafts, which will be connected with the embankments by light girder bridges. Each reservoir is provided with an overflow into a flood watercourse which skirts the upper and middle reservoirs, and carries water straight away for compensation purposes. By means of this watercourse, the town's supply is kept clear at times of storm flood. The water from Walshaw Dean is to be conveyed by a new conduit as far as Holme End, half-a-mile away, where the iron syphon pipes from Widdop are joined.

It is expected that the final cost of reservoirs will be upwards of £350,000, exclusive of the cost of land and water rights purchased from Lord Savile for £30,000. Up to Dec. 31, 1906, the actual capital expenditure on works was £299,616; and from that date to July 31 last an additional £60,000 was paid to the Contractor. The total borrowing powers amounted to £280,097; and these were exhausted on June 1 last.

* This installation was mentioned in the first of the articles on "The Centenary of Gas Lighting" (see *ante*, p. 87), which are concluded to-day.—ED. J.G.L.

The money required since that date has all been borrowed under the sanction of the Local Government Board. The uncertainty as to the ultimate cost is due to a dispute between the Engineers and the Contractor in regard to the latter's claim of £77,000 for extras. The settlement has been postponed until the works are finished, when it is hoped a satisfactory arrangement will be possible. The original contract was for £172,335. In August, 1901, the Council confirmed a resolution to spend £2000 extra in beaching the sides of the reservoirs below the depths specified in the contract; and in May, 1904, they agreed upon a further sum of £8000 for taking out the peat from the inside of the reservoir—bringing the total amount of the contract to £182,335. The disparity between even this sum and the actual cost has been brought about mainly by the great depths to which the three puddle trenches have had to be carried before really water-tight foundations were reached. At first, it was expected that a depth of 60 feet in each case would be sufficient. But as the work proceeded a great fault in the strata was discovered running diagonally across the valley—the result being that the three trenches now vary from a depth of 80 feet to 160 feet. Then another fault was discovered at the end of one of the main trenches; and this compelled the construction of a wing trench at an expenditure of £8000. The largest part of the extras claimed by the Contractor is a sum of nearly £44,000 for excavating and puddling the trenches.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

It may be remembered that some time ago, a Committee of the Selkirk Town Council were appointed to consider as to the acquiring of the undertaking of the Selkirk Gas Company. This Committee, founding upon a report to them by Mr. W. R. Herring, of Edinburgh, recommended that the Company be offered £10,087 for their undertaking. A week or two ago the Chairman of the Company stated, at the annual meeting, that the Directors had rejected the offer without consulting the shareholders, as it was quite inadequate and out of all approximation to the valuation by another expert, who had put the price at about £25,000. But after the annual meeting the Company made an offer of their whole undertaking to the Town Council for £15,000. This offer has been under consideration by a Committee of the Council, who have recommended that it be rejected, but that a further offer be made to the Company of the payment of annuities at the rate of 12½ per cent. upon the present share capital of £4500, by means of bonds, not bearing interest, for £15 per £5 share, payable in thirty years. These annuities will amount to £562 10s. a year, and in thirty years to £16,875, or £1875 more than the offer of the Company, but spread over thirty years. As the Company pay 10 per cent. per annum, the benefit to the shareholders by the recommendation of the Committee would be only 2½ per cent. per annum for thirty years. A writer upon the subject says that though it may be impossible to say what the actual present value of the Committee's recommendation is in cash, it may probably be put at £13,500, on the basis that a £15 bond is given for every £5 share. "The discussion of the matter," it is said, "will be followed with interest; but before the burgh take the business—if it be decided to take it—the question must be submitted to the ratepayers, and an election fought on it. The present price of gas is only 2s. 6d. per 1000 cubic feet; and unless the municipalizers can show that they can supply it equally good and cheap, and add no more to the municipal burdens, the public are not likely to entertain the scheme. The valuation of the Company's property in their annual balance-sheet is over £20,000; so that it is by no means certain that they will entertain the offer proposed to be made, which is so very much lower."

At Peterhead, on Monday, Bailie Birnie presented the accounts of the Gas Department for the past twelve months. The year had been the most favourable for them since the works became the property of the town. The gas produced had been 42,878,900 cubic feet—an increase over the previous year of 3,648,300 cubic feet; the increase requiring only 47 tons more of coal. The revenue from the sale of gas was £6101; from residual products, £1535; and from rents, £60; a total of £7695. Coal, including freight and cartage, had cost £77, and stokers' wages £11 more; but the total salaries were £29 less. In maintenance they had a saving of £154, at no sacrifice of efficiency. There were now 1453 ordinary and 1005 prepayment consumers—2458 in all. Neither class was charged a higher rate than the other. They were at the present time improving the storage accommodation, and would now have a works which would not be surpassed by any town of its size. Mr. Samuel Milne, of Aberdeen, had valued the works at a figure which was very satisfactory; being £6531 more than the previous valuation. The year closed with a profit of £900, notwithstanding a considerable reduction in the price of gas at the commencement. But for the saving effected in the estimated consumption of coal, and the available balance of coal at last year's prices, it would have been necessary to increase the price of gas this year, as, assuming the same consumption, the advance in the price of coal would have meant an additional expenditure of £602. He proposed that £500 be set aside as a reserve fund, and that the balance be used in providing a new roof to the retort-house, and other repairs. The Convener expressed the appreciation of the Committee of the loyal service of the gas-works employees, and said he thought it would be a graceful act to give the Gas Manager a similar salary to that paid to the former Manager before he left—viz., £170. This was agreed to, as was also the adoption of the accounts.

The thirty-first annual meeting of the Penicuik and District Gas Company was held on Tuesday. A profit for the year of £519 was reported. It was agreed, after paying a dividend of 5 per cent. upon the preference shares, to pay a similar amount on the ordinary shares, free of income-tax.

At the monthly meeting of the Johnstone Gas Commissioners on Monday, it was stated that it was estimated that if the prices of gas were continued at the same rates as last year, there would be a deficiency on the twelve months' working of £538. The Commissioners agreed to raise the price by 2d. per 1000 cubic feet; making it 2s. 6d. per 1000 cubic feet for lighting, and 2s. 4d. for power.

At the International Exhibition on School Hygiene, lately held at the Imperial Institute, Messrs. A. E. Podmore and Co. were awarded a bronze medal for their dust-proof bunsen burner incandescent gas-lamp.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 496.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
500,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	20—21	..	5 0 0
268,324	10	,,	7½	Do. 7 p.c.	13½—14½	..	5 3 5
200,000	5	May 15	7	Bombay, Ltd.	6⅞—7	..	5 0 0
40,000	5	,,	7	Do. New, £4 paid	4¾—5¼	..	5 6 8
50,000	10	Feb. 28	14	Bourne-mouth Gas and Water 10 p.c. B 7 p.c. Pref. 6 p.c.	27⅝—28½	..	4 18 3
51,810	10	,,	7		16½—17	..	4 2 4
53,200	10	,,	6		15—16	..	3 15 0
380,000	Stk.	Aug. 15	12½	Brentford Consolidated	245—250*	+1½	5 0 0
300,000	,,	,,	9⅜	Do. New	185—190*	+1	5 0 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	115—120*	+½	4 3 4
206,250	,,	June 13	4	Do. 4 p.c. Deb.	103—103	..	3 17 8
220,000	Stk.	Mch. 14	11½	Brighton & Hove Orig.	220—225	..	5 0 0
246,320	,,	,,	8½	Do. A. Ord. Stk.	160—165	..	5 0 0
460,000	20	Apl. 11	10	British	41¾—42½	..	4 14 1
104,000	Stk.	Aug. 15	6	Bromley, Ord. 5 p.c.	116—119*	..	5 0 10
165,700	,,	,,	4⅜	Do. do. 3½ p.c.	87—90*	—¾	5 0 0
500,000	10	May 15	7	Buenos Ayres (New) Ltd.	10¾—11¼	..	6 4 5
250,000	Stk.	June 27	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
150,000	20	July 12	8¾	Cagliari, Ltd.	26—27	..	5 17 10
100,000	10	June 13	10	Cape Town & Dis., Ltd.	11—13	..	7 13 10
100,000	10	Apl. 26	4⅜	Do. 4½ p.c Pref.	8—9	..	5 0 0
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	50—52	..	5 15 5
50,000	Stk.	June 27	4½	Do. 4½ p.c. Deb. Stk.	94—96	..	4 13 9
157,150	Stk.	Aug. 15	5	Chester 5 p.c. Ord.	106½—108½*	..	4 12 2
1,443,280	Stk.	,,	5⅛	Commercial 4 p.c Stk.	103—108	..	4 16 4
560,000	,,	,,	5	Do. 3½ p.c. do.	104—105	..	4 15 3
475,000	,,	June 13	3	Do. 3 p.c. Deb. Stk.	81—83	..	3 12 3
800,000	Stk.	,,	6⅛	Continental Union, Ltd.	112—1.7	..	5 11 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	136—141	..	4 19 3
460,170	Stk.	—	5⅛	Derby Con. Stk.	123—125	..	4 8 0
55,000	,,	Jan.	4	Do. Deb. Stk.	102—104	..	3 16 11
486,090	,,	July 31	2	European, Ltd.	22½—23½	..	5 2 2
354,060	,,	,,	12	Do. £7 10s. paid	17½—18½	..	4 17 4
15,18:,590	Stk.	Aug. 15	1.16	Gas-light and Coke Gas 4 p.c. Ord.	92—94*	..	4 13 6
2,600,000	,,	,,	3½	3½ p.c. max.	86—88*	..	3 19 7
3,799,735	,,	,,	4	4 p.c. Con. Pref.	102—105*	..	3 16 2
4,193,975	,,	June 13	3	¾ p.c. Con. Deb.	82—84	..	3 11 5
258,740	Stk.	Mch. 14	5	Hastings & St. L. 3½ p.c.	95—100	..	5 0 0
82,500	,,	,,	6½	Do. do. 5 p.c.	116—119	..	5 9 3
70,000	10	Apl. 26	11	Hongkong & China, Ltd.	15—20	..	5 10 0
4,940,000	Stk.	May 15	8	Imperial Continental	173—175	..	4 11 5
473,600	Stk.	Aug. 15	3½	Do. 3½ p.c. Deb. Red.	91—93*	..	3 15 3
184,602	Stk.	Mch. 14	6	Lea Bridge Ord. 5 p.c.	110—120	..	5 0 0
306,083	,,	June 27	4	L'rpool Unit'd Deb. Stk.	108—110	..	3 12 9

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
561,000	Stk.	Feb. 28	10	Liverpool United A	222—224	+1	4 9 3
718,100	,,	,,	7	Do. B	164—165	..	4 4 10
152,736	Stk.	Feb. 14	7⅛	Maidstone 5 p.c.	142—147	..	5 3 8
75,000	5	June 27	5	Malta & Medn., Ltd.	4—4⅛	..	5 11 1
560,000	100	Apl. 2	5	Met. of 5 p.c. Deb.	100—102	..	4 18 0
250,000	100	,,	4⅛	Melbourne 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	May 30	3½	Monte Video, Ltd.	10⅜—11⅛	..	6 1 9
1,775,892	Stk.	Aug. 15	4⅛	Newc'tle & G'tesh'd Cor.	107—108*	+¼	4 5 7
406,025	Stk.	June 27	3½	Do. 3½ p.c. Deb.	92—93	—1	3 15 3
15,000	10	Feb. 28	10	North Middlesex 10 p.c.	196—206	..	4 17 7
55,940	10	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	Stk.	Apl. 26	8	Oriental, Ltd.	140—145	..	5 10 4
60,000	5	Mch. 27	7	Ottoman, Ltd.	6—6½	..	5 7 8
398,490	5	May 15	7	Primitiva Ord.	6¾—7¼	..	4 16 7
796,980	5	July 31	5	Do. 5 p.c. Pref.	4⅝—5⅛	..	4 17 7
488,900	100	June 1	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
1,000,000	10	Apl. 26	8	River Plate Ord.	12¾—13¼	..	6 0 9
312,650	Stk.	June 27	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
250,000	10	Mch. 27	8	San Paulo, Ltd.	12¾—13¼	..	6 0 9
125,000	50	July 1	5	Do. 5 p.c. Deb.	48—.0	..	5 0 0
135,000	Stk.	Mch. 14	10	Sheffield A	246—248	..	4 0 8
209,984	,,	,,	10	Do. B	246—248	..	4 0 8
523,500	,,	,,	10	Do. C	246—248	..	4 0 8
70,000	10	June 13	10	South African	15—10	..	0 5 0
6,429,895	Stk.	Aug. 15	5½	South Met., 4 p.c. Ord.	118—120*	+¾	4 11 8
1,895,445	,,	July 12	3	Do. 3 p.c. Deb.	81—83	—1	3 12 3
201,720	Stk	Mch. 14	8	South Shields Con. Stk.	159—101	..	4 19 5
665,000	Stk.	Aug. 15	5½	S'th Suburb'n Ord. 5 p.c	115—110*	..	4 13 3
60,000	,,	,,	5	Do. 5 p.c. Pref.	117—120*	—½	4 3 4
117,058	,,	July 12	5	Do. 5 p.c. Deb. Stk.	120—125	..	4 0 0
502,310	Stk.	May 15	5	Southampton Ord.	105—110	..	4 10 11
120,000	Stk.	Aug. 15	6¾	Tottenham A 5 p.c. and B 3½ p.c.	120—123*	+¾	5 9 9
398,940	,,	,,	4¼		98—101*	+⅝	5 4 0
149,470	,,	June 27	4	Edmonton 4 p.c. Deb.	99—101	..	3 19 3
184,380	10	June 13	8	Tuscan, Ltd.	1¼—0⅞	..	7 8 10
149,900	10	July 1	5	Do. 5 p.c. Deb. Rec	100—102	..	4 13 0
193,742	Stk.	Feb. 28	5	Tynemouth 5 p.c. max.	107—109	..	4 11 9
30,000	Stk.	Feb. 14	8	Wandsworth A 5 p.c. and B 3½ p.c. C 3½ p.c.	—	..	—
255,636	,,	Aug. 15	6½		128—133*	+1¼	4 17 9
75,000	,,	,,	5⅝		—	..	—
80,075	,,	June 27	3	Putney 3 p.c. Deb. Stk	77—80	..	3 15 0
845,872	,,	Aug. 15	5⅛	West Ham 5 p.c. Ord.	59—102*	—⅜	5 0 6
185,000	,,	,,	5	Do. 5 p.c. Pref.	118—120*	+½	4 3 4
228,300	,,	June 27	4	Do. 4 p.c. Deb. Stk.	110—103	..	3 17 8

Prices marked * are "Ex div."

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *Aug.* 17.

There has been no material alteration in the situation during the week, demand being still mainly for the purpose of covering contracts, and fresh business being in limited compass. The available supply, however, is being absorbed; and the closing quotations are £11 15s. per ton f.o.b. Hull, £11 17s. 6d. per ton f.o.b. Liverpool, and £12 per ton f.o.b. Leith. The forward position presents no new feature. While makers generally seem to be indifferent in regard to selling for spring delivery and maintain their quotations at £12 2s. 6d. to £12 5s. per ton, buyers' views are scarcely above the level of £12 per ton. For delivery up to the end of the year, spot prices would be paid; but these do not afford sufficient attraction to makers.

Nitrate of Soda.

This article remains quiet, but firm, at 11s. 1½d. to 11s. 4½d. per cwt., according to quality, on spot.

Tar Products. LONDON, *Aug.* 17.

The market for tar products is still quiet, and there does not appear to be much hope of any great revival in business for the next week or two. Pitch remains in about the same position. There is no inclination on the part of Continental consumers to purchase at anything like the prices asked by makers in England; but it is possible that they will be more disposed to buy a little later on. In South Wales, business is reported to have been done at very low figures to the end of 1908. It is, of course, very difficult, if not almost impossible, to ship pitch at the present time of year; therefore the prompt values are to a certain extent nominal. For forward delivery, manufacturers on the east coast ask from 28s. to 28s. 6d. per ton, and equivalent prices are quoted elsewhere, but at present they cannot do business at these figures. Creosote is very firm, and values are well maintained. Benzol, 90 per cent., is weak; business having been done at the best ports on the east coast at 8d. per gallon, casks included. Benzol, 50-90's, and toluol are both very quiet indeed, there being little demand for either quality. Solvent naphtha is quiet in the North, but fairly steady in London, where actual London makes are in fair demand. Carbolic acid is steady. Continental consumers refuse to offer more than 1s. 8d. on the east coast; but manufacturers report that they are disposing of their parcels at a rather better figure than this. Crystals are dull, and hard of sale. In anthracene, a parcel has been sold during the last few days at 1½d. per unit, delivered to consumers' works.

The average values during the week were: Tar, 15s. 6d. to 20s. Pitch, London, 26s. nominal; east coast, 25s. to 25s. 6d.; west coast, 23s. 9d. to 24s. 9d. Benzol, 90 per cent., 7⅞d. to 8⅛d.; 50-90 per cent., 8½d. to 9d. Toluol, 10d. to 11d. Crude naphtha, 4d. to 4¼d.; solvent naphtha, 1s. to 1s. 2½d.; heavy naphtha, 1s. 1d. to 1s. 3d. Creosote, London, 2⅞d. to 3d.; North, 2½d. to 2⅝d. Heavy oils, 3d. to 3⅛d. Carbolic acid, 60 per cent., 1s. 8d. to 1s. 8½d. Naphthalene, £6 10s. to £12 10s.; salts, 35s. to 40s. Anthracene, "A" quality, 1½d. to 1⅝d.

Sulphate of Ammonia.

This article is steady. There is not very much business doing, and values are practically unchanged. The principal London Gas Companies still ask £12 2s. 6d. to £12 5s., but other makes can be bought upon Beckton terms for prompt delivery at £11 13s. 9d.; while £11 15s. to £11 17s. 6d. may be taken as the free alongside values in London. In Leith, business has been done again at £12, and the market is steady; most manufacturers asking £12 2s. 6d. In Hull, there is not much business doing; and the value may be taken as about £11 13s. 9d. to £11 15s. In Liverpool, sales are reported to have taken place at £11 16s. 3d. to £11 17s. 6d.

COAL TRADE REPORTS.

Lancashire Coal Trade.

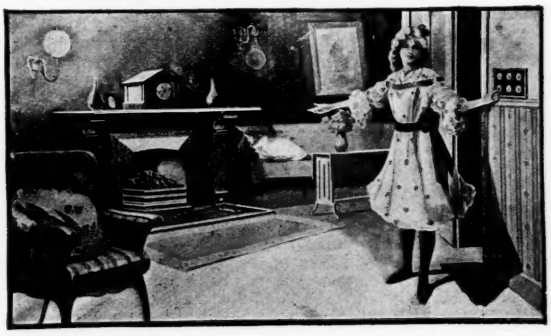
There is nothing really new, and no change, to report with regard to the Lancashire coal trade since our last issue, except that the wages of the operative miners are to be increased another 5 per cent. from Sept. 13. The trade continues as strong or stronger than ever. The summer season has made no perceptible effect on the output. There is no accumulation of stocks; and no reductions in prices. We know of one firm of colliery proprietors in the Manchester district who, having made terms with a consumer for a renewed steam coal contract at an advance of 2s. 6d. per ton on his contract of 1906, refused an offer by the same gentleman for a further supply of 50,000 tons at another 6d. per ton increase in the price. There are orders for shipping coal too heavy to be met by some of our coal owners. Gas coal and cannel, however, are rather quiet. The volume of trade done at the coal tips at Cadishead on the Ship Canal is greater than ever. More tips are wanted. The total weekly shipments average between 20,000 and 30,000 tons, the bulk of which comes from Lancashire collieries. Yorkshire and Derbyshire coal is also shipped in large quantities.

Northern Coal Trade.

There is now a very strong demand for coal; and where immediate or early delivery is needful, the range of prices is firm all round. There are now more negotiations for sales for next year's delivery. In the steam coal trade, best Northumbrians are firm at from about 16s. to 16s. 3d. per ton f.o.b., second-class steams are 15s. to 15s. 6d., and steam smalls are 10s. to 10s. 6d. The production is fair for this season—in which there are often local holidays—and is well taken up. In the gas coal trade, there is a fuller inquiry, the home consumption now showing an increase, and the exports continue very heavy. The collieries therefore are well drawn upon, and there is comparatively little fuel free for early sale. The prices quoted are from 13s. 9d. to 15s. per ton f.o.b. for gas coal, according to quality, with occasionally a

ELECTRIC LIGHT SUPERSEDED.

PNEUMATIC DISTANCE GAS LIGHTER.



A FEW RECENT INSTALLATIONS.

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Madam Tussaud's, London	GASLIGHT AND COKE COMPANY, LONDON.
Bethnal Green Fire Station (L.C.C.)	
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St. Martin's Hall, Gospel Oak	
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Carmel Chapel, Aberdare	
Miles & Sons' Restaurant, Aberdare	
Christ Church, West Bromwich	
Baptist Chapel, Redhill	
Christ Church, Wallington	
Holy Trinity Church, Wallington	
Baptist Chapel, Woodside	
Radcliffe Theatre, Radcliffe, Lancs.	
Theatre Royal, Chorley,	
St. Giles' Church, Willenhall	
Two Churches in Cardiff	
Town Hall, Banbury	
St. Luke's Church, Bath	
St. Paul's Church, Bath	
Monkton Combe Church, Bath	
Conservative Club, Bath	
Constitutional Club, Bath	
Jolly's Establishment, Bath	
Conservative Club, Ventnor	
Bathgate Church	
Masonic Lodge, Brisbane, Australia	
St. Patrick's Cathedral, Auckland, N.Z.	
New Council House, Smethwick	PNEUMATIC GAS LIGHTING CO.'S FITTING DEPT.
Royal York Hotel, Margate	
St. Martin's Church, Bedford	
St. Paul's Church, Haggerston, N.E.	
Angel Hotel, Henley-on-Thames	
Red Lion Hotel, ,,	
Phyllis Court Club, ,,	
Club House, Datchet	

PNEUMATIC GAS LIGHTING CO., LTD.,

36, Farringdon Street, E.C.

Telephone 2123 HOLBORN. Tele. Address: "OMNIBUSSES, LONDON."

higher figure for one or two kinds. There is not much doing in ordinary contracts at present; but sales are now being concluded for export quantities for forward shipment. In one case, a lot has been sold for export to Italy over next year at a price that is expected to allow about 14s. 3d. per ton f.o.b. for best Durham gas coals. The coke trade is firm, and gas coke is strong; but there is now an increasing output. From 19s. to 20s. per ton f.o.b. is the current quotation for good gas coke.

Scotch Coal Trade.

Trade has been very active; foreign buyers being apparently anxious to stock coal before the winter sets in. The shipping trade is, in consequence, exceptionally busy. All classes are in demand; and ell is reported to be scarce. The prices quoted are: Ell 13s. to 15s. per ton f.o.b. Glasgow, splint 14s. to 14s. 6d., and steam 12s. 9d. to 13s. The shipments for the week amounted to 342,828 tons—an increase of 32,598 tons upon the previous week, and of 19,884 tons upon the corresponding week of last year. For the year to date, the total shipments have been 8,791,399 tons—an increase of 596,558 tons.

Gas Supply in North London Suburbs.

At the half-yearly general meeting of the Southgate and District Gas Company next Thursday, the Directors will report an increase of 5,348,700 cubic feet, or 10 per cent., in the sale of gas in the six months ending the 30th of June. The total sales amounted to 58,227,500 cubic feet; and the net revenue therefrom was £10,674. The receipts for the half year were £12,877, and the expenses £9924; leaving a balance of £2952. After charging interest on debenture stock, &c., there is a sum of £4337 available for distribution; and the Directors recommend the declaration of dividends for the half year at the maximum rates of 5, 10, and 7 per cent. per annum on the preference, original, and additional capital respectively. These payments will absorb £2478, and leave £1859 to be carried forward. In the case of another Company which may now almost be regarded as a North Suburban one—the Waltham Abbey and Cheshunt Gas Company—the quantity of gas sold in the six months ending the 30th of June showed an improvement; and there was a satisfactory increase in the amount received for residuals. The revenue was £7349, and the expenditure £4971; leaving £2378 to be carried to the profit and loss account. The net profit for the half year was £2769; and at the recent half-yearly meeting dividends at the rate of 8½ per cent. per annum on the "A" shares, and 6½ per cent. per annum on the "B," "C," and "D" shares were declared. These, together with the debenture stock interest, required £2322, and left £447 to be carried forward.

Rhyl District Council Gas Undertaking.

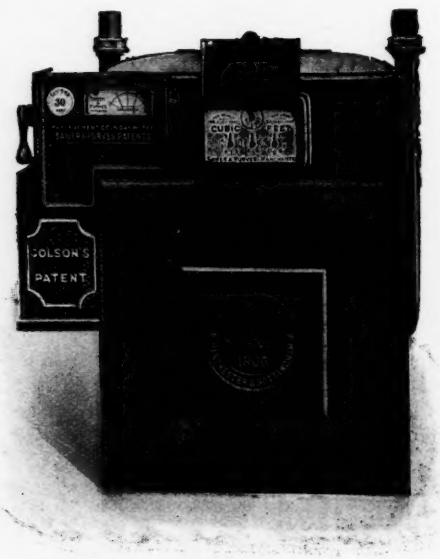
The Gas Engineer and Manager of the Rhyl Urban District Council (Mr. Leonard G. Hall) has presented to the Gas Committee his working statement for the year ending the 31st of March. It shows that the gross cost of gas was £5962; being at the rate of 28·04d. per 1000 cubic feet of gas sold and 24s. 5·13d. per ton of coal carbonized. The net-cost figures are £4244, 19·96d., and 17s. 4·64d. respectively. The revenue from gas was £9007, being 42·36d. per 1000 cubic feet of gas sold and 36s. 10·81d. per ton of coal; and the profit on revenue account was £4763, being 22·4d. per 1000 cubic feet of gas sold and 19s. 6·17d. per ton of coal. The total make of gas was 54,429,500 cubic feet, of which 46,181,200 cubic feet, or 84 85 per cent., were sold for private consumption, and 4,844,500 cubic feet, or 8·9 per cent., for public purposes. The unaccounted-for gas was 5·1 per cent., against 6·27 per cent. in the year 1905·6. The make of gas was at the rate of 11,148 cubic feet per ton of coal carbonized; and 10,452 cubic feet per ton were sold. The working statement did not include expenditure or income on cookers, fittings, or new meters, nor an item of £391, the second instalment, paid out of revenue, for a new retort-bench—these not being items of the revenue account. The interest on the loan amounted to £1181 10s. 7d.; and the sum set aside for redemption was £1429 2s. 7d.—making together £2610 13s. 2d. Referring to the statement at the last monthly meeting of the Council, Mr. Perks commented on its extremely favourable character, particularly in regard to the reduction in the unaccounted-for gas, which he pointed out had been brought down to the low figure of 5·1 per cent., and the satisfactory yield of 11,148 cubic feet of gas per ton of coal carbonized. The Gas Committee congratulated Mr. Hall on the highly satisfactory result of the year's working, and expressed their warm thanks to him for the ability and zeal he displayed in performing the duties of his office. It was resolved that he should report fully to the Committee on the adequacy of the plant to meet present and future demands for gas.

Dawlish Water Supply.—The members of the Dawlish District Council paid their annual visit of inspection to the water-works last Wednesday. It was stated in the course of the proceedings that the works had been established for thirty years, and had given great satisfaction. In 1910 the original loan of £10,526 will be paid off, and the capital indebtedness on the undertaking will then be very small. Mr. J. Shapter, the Chairman of the Water Committee, said that when this position was reached the Council would no doubt consider the question of improving the supply and constructing storage works.

Rand Water Board.—The report and accounts of the Board for the year ended the 31st of March last have been submitted to the Colonial Secretary of the Transvaal. They show that the revenue was £161,936, while the expenditure amounted to £147,068; leaving a surplus of £14,868. Out of this sum, £10,226 is placed to the machinery and plant renewal fund; leaving an unappropriated balance of £4642. The total quantity of water supplied during the year amounted to 1,020,908,000 gallons, of which 826,846,000 gallons, or 85 per cent., were sold to municipal authorities, and 151,056,000 gallons, or 15 per cent., to mining companies. Of the total quantity sold, 792,165,000 gallons were used in Johannesburg, 212,147,000 gallons on the East Rand, and 16,596,000 gallons on the West Rand. The charge for water was reduced on Nov. 1 from 3s. 6d. to 3s. per 1000 gallons in anticipation of an increased demand which did not arise.

Sawer & Purves,
NELSON METER WORKS,
MANCHESTER.

PREPAYMENT METERS



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NOTTINGHAM.

Skegness District Council and the Water-Works.—Under advice from their Consulting Engineer, the Skegness Urban District Council have decided to promote a Bill next session to authorize them to purchase the undertaking of the Skegness Water Company, and to make further and better provision with regard to the improvement, health, local government, and finance of the district.

Colwyn Bay Water Supply.—The Cowlyd Water Board are preparing to apply to Parliament for an Act to sanction the abstraction of a larger quantity of water than is at present allowed by the terms under which they obtained the freehold of the lake and watershed from Lords Ancaster and Newborough. The Board have also decided that, as soon as the Bill is passed, the laying of an extra main to Colwyn Bay will be proceeded with.

Sussex Town in Darkness.—The Hurstpierpoint (Sussex) Council, after several meetings and interviews, have refused to accept the Gas Company's terms for lighting and extinguishing the public lamps; and, there being no other lighting authority in the district, the town is in darkness. At a Council meeting on Saturday night, the Chairman, Mr. A. Weekes, J.P., said the matter was becoming a scandal. Ladies had to take bicycle lamps with them to find their way about; and there was danger of accidents. A motion to compromise with the Company was defeated.

The Award in the Neyland Gas Arbitration.—The Pembroke Dock and Town Gas Company have taken up the award of Mr. W. A. M'Intosh Valon, the Umpire in the arbitration proceedings (see *ante*, p. 339) to determine the amount to be paid by the Neyland Urban District Council for the works, mains, and plant of the Company situated within their district. The Company claimed £3003 18s. 3d.; and the Council offered £1300. The amount awarded is £1704 5s. 5d.; being £1597 for the purchase of the mains, pipes, and works, and £107 5s. 5d. for additional works carried out after the notice to treat.

The Recent Accident at the South Suburban Gas-Works.—The accident which occurred at the South Suburban Gas Company's works on July 12 ended last Wednesday in the death of the workman concerned. On the day in question, it may be remembered, a fire occurred in one of the gasholders, which was being enlarged by a Leeds firm of contractors. After the fire had been extinguished, work was resumed until a riveter's "holder-up," named Edward Tyler, aged 35, living at Leeds, had a terrible fall—pitching headlong into the empty well of the holder, between the iron plating of the telescopic partitions. When picked up in an unconscious condition, he was removed to Lewisham Infirmary, and he remained there till his death occurred at 10.30 a.m. last Wednesday. Tyler was a married man with two children.

Warrington Corporation Gas Supply.—The Gas Engineer to the Warrington Corporation (Mr. W. S. Haddock) has presented to the Gas Committee his nineteenth annual report. In the course of it, he points out that the large increase in the item of coal and cannel shown by the accounts is due to an advance in price and much larger consumption; and he says the higher cost of the raw material and the reduced price of gas will probably reduce the profits next year by £5000 or £6000. The increased make of gas in the year covered by the report was 28,595,800 cubic feet, or 6·9 per cent. more than in the preceding year. The statement of expenditure and revenue shows that the total expenditure for the year was £51,637, and the total revenue £74,876; leaving a gross profit of £23,239. The gross profit in 1906 was £22,974. Out of the gross profits, however, have to be paid annuities, interest, and an amount to the sinking fund, coming altogether to about £8000. The greater portion of the balance goes to the relief of the rates.

New Joint-Stock Companies.—The Plaissetty Manufacturing Company, Limited, has been registered with a capital of £75,000, in £1 shares, to acquire from Messrs. T. Terrell and J. P. H. Soper inventions in respect of incandescent filaments and mantles and burners for use in connection with mantles or lighting, and patents and rights relating thereto, together with the business and assets of the Plaissetty Manufacturing Company, at Lewisham; to adopt an agreement with the above-named gentlemen; and to carry on the business of manufacturers of, and dealers in, mantles, threads, filaments, silks, and other materials or apparatus for incandescent lighting, lamps, gas-fittings, &c. There will be no initial public issue. The Kippax and District Gas Company, Limited, has been registered with a capital of £15,000, in £1 shares, to acquire the business of gas manufacturers and suppliers carried on at Kippax, Yorkshire, as the Kippax Gas Company; to adopt an agreement with Mr. Robert Porter; and to manufacture, sell, and supply gas for lighting, heating, or other purposes in the parishes of Kippax and Great and Little Preston. Among the subscribers are Mr. R. Porter, the Gas Engineer, and Mr. B. Porter, the Assistant Gas Engineer, of the Elland Gas Company. There will be no initial public issue.

Gainsborough's Gas-Works Profits.—The gas undertaking of the Gainsborough Urban District Council has to its credit another successful year's working. The profit and loss account of the Gas Department was presented last week for the year ending March 31, showing receipts of £14,939 and expenditure of £13,821—a profit of £1118. During the year extra discount to consumers amounting to £334 was given. The work of improving the lighting of the town, by the conversion of ordinary street-lamps to the incandescent system, cost £200 more than the previous year. The quantity of gas made was 85,094,000 cubic feet—an increase of 1,806,000 cubic feet. The coal carbonized amounted to 7648 tons—an increase of 126 tons. The make of gas per ton of coal carbonized was 11,125 cubic feet per ton, or an increase of 53 cubic feet compared with the previous year. This satisfactory make of gas per ton of coal carbonized, the Chairman stated, has been brought about by the very close attention given by the Gas Manager (Mr. John Baldwin), and will compare favourably with other works in the country. The receipts from tar and ammoniacal liquor are less, but the aggregate income from residual products is slightly more. The number of meters now fixed is 2167, being an increase of 191 on the year. Gas cookers still continue to increase in popularity; the number in use to date being 560, or an increase of 128. Owing to the advance in the price of coal, over £900 of the profits made are earmarked.

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SUPPLIES HOT WATER

For Bath,
For Baby,
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In any part of the House;
Day and night;
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London Offices and Show-Rooms: 132, QUEEN VICTORIA STREET, E.C.
General Offices and Works: WARRINGTON, &c.

Guildford Water Supply.—The Guildford Corporation have applied to the Local Government Board for sanction to a loan of £56,296 for the purchase of the portion of the Woking Water Company's undertaking which supplies properties in Stoke. The loan is made up as follows: Arbitrator's award, £46,900; laying new mains for the Company, £3789; connecting mains with the Corporation works, £875; Arbitrator's charges, £354 10s.; taxed costs of the Company in the arbitration, £1767; Corporation's costs, £2566. At the inquiry into the matter on behalf of the Board, Mr. C. G. Mason, the Borough Engineer, said he estimated that in 1911 the supply would not only be ample to meet the needs of the whole area, but that there would be an excess of 300,000 gallons per diem. Dr. Thresh, who had been carrying out very careful experiments and analyses, described the water as excellent and of remarkable purity.

Progress of the Harrogate Water-Works.—The new water-works which the Harrogate Corporation are constructing at Roundhills are reported by a local paper to be going steadily forward, and making most satisfactory progress. The tunnel, when completed, will be more than three miles long. It was commenced in 1902, and up to the 25th of July last 5018 yards had been driven. The Engineer (Mr. E. W. Dixon) says that should the total rate of progress average 30 yards per week, the tunnel should be driven through in seven months. On the main dam, the difficulties in the wing-trenches having been overcome, good progress is being made. The estimated volume of masonry and concrete in the whole dam when completed is about 123,000 cubic yards, of which 54,000 yards have been executed. This is equal to about five-twelfths of the total work; so that with the tunnel nearly through, the settling reservoirs completed, the pipe-track laid, and all the difficulties of the trench settled, the completion of the scheme in three years from the present time may safely be prophesied.

South Molton Water Supply.—Early in the present year, the South Molton Town Council sought the advice of Mr. J. Siddalls, the Borough Surveyor of Tiverton, with regard to the improvement of the water supply. Mr. Siddalls recommended, among other things, the construction of new filters, and the covering of the service reservoir—pointing out that, owing to the defective construction of the present reservoirs, the water is really less pure after filtration than before it. The Town Council, however, came to the conclusion that action on the matter might be deferred, as the proposed expenditure (£3200) would mean an addition of 5d. in the pound to the rates. At a meeting of the Council last Tuesday, a letter was read from the Local Government Board, urging that the matter should receive further consideration with a view to putting the works into a thoroughly efficient condition. The Mayor (Mr. J. Sanders) proposed that an answer should be sent to the effect that the Council were prepared to proceed with the construction of new filter-beds. He said they had bought land for this purpose, having told the Local Government Board that the present filter-beds were inadequate; but they had let the land and had abandoned expert advice for that of members of the Council. The motion was lost; and it was decided to inform the Board that the Council were going to take steps to put the filter-beds in a satisfactory state of repair. The question was referred to a Committee. The Clerk pointed out that were money spent on repairs it would possibly be useless, as the Local Government Board might insist on the necessity for new beds.

The Directors of Messrs. Fletcher, Russell, and Co., Limited, announce an interim dividend at the rate of 10 per cent. per annum on the ordinary shares for the half year to the 31st of August.

With the current volume, the "Builder" commenced, in "The Student's Column," a series of well-written articles on "Modern Methods of Using Gas." In the last number the subject of factory lighting is dealt with; and three good examples are given, comprising a foundry lighted with high-pressure gas, a pattern-shop lighted with anti-vibration gas-fittings, and a tailors' shop lighted with high-pressure inverted burners.

The Water Committee of the Bolton Corporation have entered into the following contracts: With Messrs. John Best and Sons, Limited, of Edinburgh, for the construction of the Delph reservoir; with Messrs. Glenfield and Kennedy, Limited, for the supply and fixing of a valve-shaft, lining and stand-pipe, footbridge, sluice-valves, &c.; and with the Staveley Coal and Iron Company, Limited, for the supply of cast-iron pipes for the reservoir.

A report has been received from Mr. Albert Halstead, the United States Consul at Birmingham, by the Washington Bureau of Manufactures, with reference to an automatic chain-making machine, which has been perfected by the Gilbert Little Company, of Bradford. The Consul states that the idea is said to have originated in Canada, and for smaller sizes, to make chains for reaping and binding machines, it was somewhat of a success; but for heavier chains and larger sizes the machine had to be reconstructed and remodelled, and this is what has been done. He explains that the machine draws in a steel bar at one end, and the bar issues at the other in the form of a steel-link chain, completely assembled.

At the Westminster Palace Hotel last Wednesday, a meeting of the Coal Conciliation Board was held to consider an application by the miners for an advance of 5 per cent. in wages. The following resolution was agreed to: "That the present rate of wages be advanced as from the first making-up day after Sept. 13 by 5 per cent. on the standard. Such advance is not justified by the figures, but is given in the belief that there is a rising market; and it is agreed between the parties that this advance shall not disturb the relations which have hitherto subsisted between wages and selling prices. That the above resolution applies to the wages of all underground labour and to the wages of all surface labour on the pit-bank and screens engaged in manipulating the coal as heretofore." This advance brings wages up to 2½ per cent. above the advances obtained in South Wales. It is the third increase of 5 per cent. granted this year.

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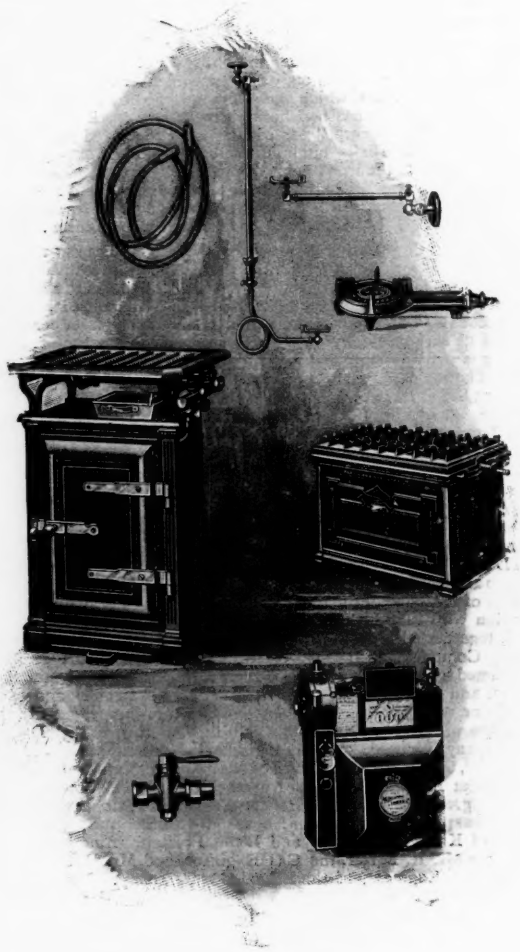
SLOT

INSTALLATIONS.



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Bell Barn Road, BIRMINGHAM.

An application made to the Local Government Board by the Calne Corporation, for authority to borrow £2500 for the provision of filter-beds, was not opposed at an inquiry held on behalf of the Board last Thursday.

At a recent meeting of the Gas Committee of the Mansfield Town Council, a report was presented on the inspection of a sulphate plant at Kingston-on-Thames; and the Committee strongly recommended the Council to have similar plant erected at Mansfield, and to have the necessary plans and an estimate of the cost prepared. This was agreed to.

At the last meeting of the Bideford Board of Guardians, a letter was read from the Local Government Board on the subject of a surcharge made by the District Auditor of £35 5s. 3d. in respect of sums paid to the Urban District Council for the supply of water to the Workhouse. The Board discharged the surcharge, and suggested that, in view of the case under appeal of the Chester Guardians and the Chester Water Company, the Board and the Council should enter into an agreement for the supply of water until the appeal has been heard. On the suggestion of the Clerk, the matter was referred to a Committee.

LEAFLETS FOR DISTRIBUTION.

"ILLUMINATING TRUTHS FOR HOUSEHOLDERS."

No. 1.—"The Sanitary Aspects of Gas and Electric Lighting."
No. 2.—"The Cleanliness of Illuminants: The Eyesight."
No. 3.—"Fire Risks."
No. 4.—"The Relative Cost of Gas and Electricity, and Matters affecting it."
No. 5.—"On Reliability, with Instances of Misplaced Confidence."
No. 6.—"On Shop Lighting, with Special Reference to the Flame Arc Lamp."

This series of Leaflets will be useful, not only for distribution among Householders generally, but for circulation among Shareholders to fortify them with arguments in defence of the commodity in which they have invested capital. Copies of each Leaflet should also be kept in every Gas Undertaking's Show-Rooms.
Prices for Quantities on Application to WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

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ACCOUNTANT AND CASHIER. Applications by Aug. 26. No. 4818.
SERVICE AND MAINLAYER. No. 4815.
SLOT COLLECTOR. Ilford Gas Company.
WORKING MANAGER. No. 4816.

Situations Wanted.
IN GAS OFFICE (HOME OR ABROAD). No. 4820.
MANAGER OR FOREMAN. No. 4819.
REPRESENTATIVE (GAS AND WATER). No. 4813.

Partnerships and Management.
GAS ENGINEER'S BUSINESS. No. 4817.
GAS LIGHTING. No. 4814.

As Representative of Gas and Water Firm.
No. 4821.

Company Meetings.
BRIGHTON AND HOVE GAS COMPANY. London Office. Sept. 13, Two o'clock.
THE CRAYS GAS COMPANY. St. Mary Cray. Aug. 28, 6.30 o'clock.

Plant (Second-Hand), &c., for Sale.
ACETYLENE GAS PLANT. Burgess and Son, Leicester.
STATION METER AND EXHAUSTER. Penrith Gas Works.

Plant, &c, Wanted.
SULPHATE PLANT. Goold, Hop Exchange.

Stocks and Shares.
BOGNOR GASLIGHT AND COKE COMPANY. Aug. 28.

TENDERS FOR

Brass Cocks, &c.
BRADFORD GAS DEPARTMENT. Tenders by Sept. 12.

Coal and Cannel.
RAMSGATE CORPORATION. Tenders by Sept. 2.
TENBY GAS COMPANY.

Coke.
RAMSGATE CORPORATION. Tenders by Sept. 2.

General Stores, Oxide Wiskets, Shovels, Oils, Glass, &c.
BRADFORD GAS DEPARTMENT. Tenders by Sept. 12.

Iron and Steel.
BRADFORD GAS DEPARTMENT. Tenders by Sept. 12.

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BRADFORD GAS DEPARTMENT. Tenders by Sept 12.

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BRADFORD GAS DEPARTMENT. Tenders by Sept. 12.

Pipes, &c.
BRADFORD GAS DEPARTMENT. Tenders by Sept. 12.
HORLEY GAS COMPANY.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

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Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

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O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE,

SPENT OXIDE PURCHASED IN ANY DISTRICT.

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"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, WAKEFIELD, and SUNDERLAND.

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WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
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THE First Dutch Bogore Co., Ltd., HOLLAND.
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General Manager (for Scotland)—
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Offices: Commercial Buildings, LEEDS.
Correspondence invited.

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PAINT FOR GAS-WORKS

BALE & CHURCH,
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SULPHURIC ACID.

SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD., with which is amalgamated WM. PEARCE & SONS, LTD.
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Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341, AVENUE.

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ANY QUANTITIES. ANY PORT.

DONALD McINTOSH,
110, CANNON STREET,
LONDON, E.C.
SPENT OXIDE PURCHASED.

ROBERT DEMPSTER & SONS, Ltd.
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

TEMPERLEY TRANSPORTERS
FOR Rapid and Economical Handling of Coal and Coke in Gas-Works.
Next Illustrated advt. will appear on Sept. 10.
TEMPERLEY TRANSPORTER COMPANY,
72, Bishopsgate Street Within, London, E.C.
Telephone: 365 London Wall. Telegrams: "Transumo."

AMMONIACAL Liquor wanted.
Brotherton and Co., Ltd., Ammonia Distillers. Works: Birmingham, Glasgow, Leeds, Liverpool, Wakefield, and Sunderland.

"NUGEPE" GAS PLANT CEMENT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

BENZOL
AND
CARBURINE FOR GAS ENRICHING.
ALSO
THE MAXIM PATENT CARBURETTOR.
For Prices, &c., apply to
THE GAS LIGHTING IMPROVEMENT CO., LTD.,
7, Bishopsgate Street Without,
LONDON, E.C.
Telegraphic Address: "Carburine, London."

GAS TAR wanted.
Brotherton and Co., Ltd., Tar Distillers. Works: Birmingham, Glasgow, Leeds, Liverpool, Wakefield, and Sunderland.

GAZINE—A radical Solvent and Preventative of Naphthalene deposits, and the Automatic cleaning of Mains and Services.
It is also used for the Enrichment of Gas, and has an illuminating value double that of 90 per cent. Benzol.
Supplied by C. Bourne, West Moor Chemical Works, Killingworth, or through his Agent, F. J. Nicol, Pilgrim Street Chambers, Newcastle-on-Tyne.
Telegrams: "Doric," Newcastle-on-Tyne. National Telephone No. 2497.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. Blakeley, Gas Engineer, Thornhill, Dewsbury.

BRISTOL RECORDING GAUGES AND THERMOMETERS.
J. W. & C. J. PHILLIPS, 23, College Hill, London, E.C., and 7, Park Square, Leeds.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
Read Hollyday and Sons, Ltd., Huddersfield.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
Joseph Taylor and Co., Central Plumbing Works, Bolton.
Telegrams: Saturators, Bolton. Telephone 0848.

STEAM (all Types, all Sizes) Boilers. Vertical, Loco., Cornish, Launch, Field-tube; also AIR RECEIVERS, FEED-WATER HEATERS, CYLINDERS, &c.
Grantham Boiler & Crank Co., Ltd., Grantham.

THE UNIVERSITY OF LEEDS.
DEPARTMENT OF FUEL AND GAS ENGINEERING.
THE New Building of the above Department WILL BE OPEN for the reception of Students on Oct. 1, 1907.
For Particulars respecting Degree and Diploma Courses in Gas Engineering, see Special Prospectus to be obtained on Application to the Registrar.

GENTLEMAN with a large Connection amongst Gas and Water Companies and Lighting Authorities desires to REPRESENT good firm. Whole or part services.
Address No. 4813, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

ADVERTISER requires Appointment in Gas Office (home or abroad). Thoroughly Experienced in every Department. Good Accountant. Age 28.
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ADVERTISER, at present erecting new Plant on Gas-Works in Ireland, requires permanent Position as MANAGER or FOREMAN on Medium-sized Gas-Works, or as Outdoor SUPERINTENDENT. Twelve years Experience as Assistant-Manager and Outdoor Manager on 70 Million Works. Age 27. Married. Would take anything temporarily (connected with Gas).
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MANUFACTURER'S Agent, Established Twelve Years' is open to REPRESENT Good Firm in London. Knowledge of Gas and Water Engineering, England, America, and the Colonies. Central London Office.
Address No. 4821, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, at an early date, by a North of England Gas Company, an Experienced ACCOUNTANT and CASHIER, one accustomed to the routine of a Gas Office preferred, to TAKE CHARGE of the Rental Department and the Office Staff under the Secretary.
Salary, £200 per Annum.
Applications, stating Age, which must not exceed 35 years, Experience, and enclosing *copies* of recent Testimonials, to be addressed, on or before the 26th inst., to No. 4818, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

ILFORD GAS COMPANY.
SLOT Collector wanted. Salary and Piece-work paid. Must have had previous Experience as Slot Collector or Bag Carrier.
Apply, by letter only, stating Age, Height, length of Service, and present Pay, to the Secretary, Ilford Gas Company, Broadway, Ilford.

WANTED, a Working Manager for a small Gas-Works in Mid-Wales.
Applicants should state Age, Wages required, and enclose *copies* of Two recent Testimonials to No. 4816, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

SERVICE AND MAINLAYER.
WANTED, Immediately, a good Service and MAINLAYER.
Apply, by letter, with Characters, or References, to No. 4815, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

PARTNER AND MANAGER.
WANTED, a thoroughly good Commercial Man, with about £2500 Capital, who is capable of DIRECTING or MANAGING a Gas Engineers' Business. Salary up to £300 a Year to commence with. Profit on investment, 20 per cent. Every opportunity for investigation. Highest References required and given. Sole reason for desired Partnership, shortness of Capital and Owners' time.
Principals only apply to No. 4817, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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ENERGETIC Gentleman required, with Experience and Influence, to take MANAGEMENT of a new private Company formed for working valuable Patents for High-Pressure and General Gas Lighting. Small capital.
Address No. 4814, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

FOR SALE—Two Waller's Combined STEAM-ENGINES and Three-Blade EXHAUSTERS of 15,000 and 20,000 feet capacity. Nearly new. Cheap to immediate Purchaser.
Firth Blakeley, Thornhill, Dewsbury.

SULPHATE OF AMMONIA PLANT.
WANTED, a Small, up-to-date, Second-hand PLANT, in First-Class Repair. Capacity, about One Ton per Day.
Address R. W. Goold, 35, Hop Exchange, London, S.E.

ACETYLENE Gas Plant, by Lockerbie and Wilkinson. Four Generators, Two Large Purifiers. First-Class Condition. May be inspected any time by Appointment. To be Sold Cheap.
J. Burgess and Son, Limited, Leicester.

FOR SALE.—The Gas Department of the Penrith Urban District Council have the following Second-Hand APPARATUS for sale, viz.:—
One 10,000 cubic feet per hour Round STATION METER by W. & B. Cowan.
One 10,000 cubic feet per hour Dempster's RECIPROCATING EXHAUSTER.
Particulars may be obtained on Application to the undersigned.
E. Shaul,
Manager.
Gas-Works, Penrith,
Aug. 17, 1907.

CITY OF BRADFORD.
TENDERS FOR STORES.

THE Gas Committee of the Bradford Corporation are prepared to receive TENDERS for the Supply of the following STORES required in their several Departments during a period of One Year ending Sept. 30, 1908:—

Probable Quantity Required.

Wet and Dry Gas-Meters.
Pipes and Castings.
Wrought-Iron Steam-Tubing.
Best Merchant Iron and Steel, 30 tons.
Charging Shovels, 70 dozen.
Oxide Wiskets, 25 dozen.
Cotton Waste, 60 cwt.
Best Engine Oil, 1500 gallons.
Common do., 1800 gallons.
Cylinder Oil, 1000 gallons.
Tarred Gaskin, 90 cwt.
Brass Main Gas-Cocks, 160 dozen.
Weed Brooms, 72 dozen.
Best Lime, 120 tons.
Copper Lamps, 500.
Lamp Irons, 300.
Sheet Glass for Street Lamps, 21 oz., 9000 sq. feet.
Opal Glass for Street Lamps, 21 oz., 3500 sq. feet.

Forms of Tender, with any further Information required, may be had on Application to Mr. Chas. Wood, Gas Engineer, Town Hall, and samples may be seen at Mill Street Gas-Works.
The Contracts will be let subject to the Fair Contracts Clauses of the Corporation, which may be seen at the Town Clerk's Office, and which the accepted Contractors will be required to sign.
Tenders, endorsed "Tender for Stores," to be sent to me not later than Thursday, Sept. 12.
The lowest or any Tender will not necessarily be accepted.

Frederick Stevens,
Town Clerk.
Town Hall, Bradford,
Aug. 17, 1907.

RAMSGATE CORPORATION.
(Gas and Water Department.)
THE Gas and Water Committee invite alternative TENDERS for 12,000 and 24,000 Tons (Six and Twelve Months Supply respectively) of Best Quality soft caking and gas producing Screened DURHAM or other COAL, delivered free into carts on the Quay at Ramsgate Harbour, or free into the Stores at the Gas-Works. Deliveries in either case to be in equal monthly quantities as from the 1st of February, 1908. A distinct price to be named for each quantity.
Tenders to be sent in not later than Noon on Monday, Sept. 2, 1907, addressed to the Chairman of the Gas and Water Committee, Boundary Road, Ramsgate, endorsed "Coals."
The Committee do not bind themselves to accept the lowest or any Tender.
Full Particulars and Form of Tender on Application to the undersigned.

Wm. Thomson,
Engineer and Manager.
Gas and Water Offices,
Ramsgate, August, 1907.

RAMSGATE CORPORATION.
(Gas and Water Department.)
THE Committee invite Tenders for the Purchase of the whole of their Surplus COKE, estimated at from 1500 to 2500 Tons, or for quantities of not less than 200 Tons per Annum, from the 1st of October, 1907, to the 30th of September, 1908, delivered free on rail or barge, Ramsgate, or free into carts at the Gas-Works, Ramsgate—the Purchaser in any case to pay dues.
Further Particulars, together with Conditions and Form of Tender, may be obtained from the undersigned.
Tenders to be sent in not later than Noon on Monday, Sept. 2, 1907, addressed to the Chairman of the Gas and Water Committee, Boundary Road, Ramsgate, endorsed "Tender for Coke."
The Committee do not bind themselves to accept the highest or any Tender.

Wm. Thomson,
Engineer and Manager.
Gas and Water Offices,
Ramsgate, August, 1907.

HORLEY DISTRICT GAS COMPANY.
TENDERS FOR CAST-IRON PIPES AND SPECIALS.
THE Directors of the above Company are prepared to receive TENDERS for 12-inch Cast-Iron Main PIPES, Spigot and Socket (about 350 Yards run), and SPECIALS, and 16-inch Cast-Iron SPECIALS, delivered Horley.
Tenders to be sent to the Secretary, Station Road, Horley, Surrey.

THE Tenby Gas Consumers' Company, Limited, are prepared to receive TENDERS for the Supply of 2000 Tons of GAS COAL and 1000 Tons of HOUSE COAL, for delivery during the ensuing Twelve Months.
For Forms of Tender and Further Particulars apply to Mr. Alfred H. Brookman, Engineer and Manager, Gas-Works, Tenby.
Aug. 15, 1907.

THE CRAYS GAS COMPANY.
NOTICE is Hereby Given, that the ORDINARY GENERAL MEETING of the Stockholders of the above Company will be held at the Library, St. Mary Cray, on Wednesday, the 28th day of August, 1907, at 6.30 o'clock in the evening, to receive and adopt the Directors' Report and Accounts for the Half Year ended 30th June, 1907; to declare a Dividend; and for General Business.
The TRANSFER BOOKS WILL BE CLOSED from the 14th day of August next until after the said meeting.

W. B. Mimmack,
Secretary.
The Gas-Works, St. Mary Cray,
Aug. 6, 1907.